CLIMATE PROTECTION PLAN

December 3, 2007

Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level*.[1]

[*]IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

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Executive Summary

Overview

Global warming is nearly universally recognized by scientists, and much of the public, as one of the most important threats facing human civilization, and political stability. This rise in temperatures has major implications for transboundary migration, economic prosperity, and the future of human development. Locally, the effects of climate change are likely to reduce the availability of hydro generated electricity, increase the incidence of forest fires, and lead to a rise in the level of San Francisco Bay that would impact Palo Alto's shoreline.

The Climate Protection Plan (CPP) continues a process, of which the Green Ribbon Task Force (GRTF) recommendations were an earlier step, through which the City government and the community are working together to reduce significantly greenhouse gas (GHG) emissions. A cross reference between the GRTF recommendations and those of the CPP are summarized at the end of each chapter and presented in-full in Appendix I.

The goal of the CPP is to present a comprehensive inventory of municipal (City government-generated) and community-generated emissions, propose reduction targets, and propose practical steps to reach those targets.

Setting Emission Reduction Goals

The CPP sets out goals for the reduction of CO_2 emissions from the City and the Community. These goals are:

> ***Short Term Goal:*** By 2009 the City will reduce emissions by 5% from 2005 emission levels for a total reduction of 3,266 metric tons of CO_2.
>
> ***Medium Term Goal:*** By 2012 the City and Community will reduce emissions by 5% from 2005 emissions levels for a total reduction of 39,702 metric tons of CO_2.
>
> ***Long Term Goal:*** By 2020, the City and Community will reduce emissions by 15% of 2005 levels, equal to 119,140 metric tons of CO_2, and bring the community in line with State reduction goals.

Cost Benefit Analysis and Budget Implications

The CPP begins the process of estimating the costs of potential actions, some of which would be borne by the City, and others of which would be borne by the end user or community.

The cost benefit analyses here should be considered as preliminary only. Additional, more detailed financial analyses should be carried out before many of the actions listed here are implemented. Furthermore, additional funding is required for many of the actions recommended in this report. Any actions deemed by Council worth expending City funds would be integrated into the 2008-10 budget process in spring 2008.

The table at the end of this Executive Summary lists all of the proposed actions in this report, broken out by those requiring no additional funding, and those requiring additional funding and/or additional analysis of funding needs.

Structure of the Report

This report contains eight chapters:

- Chapter 1 is the Introduction.
- Chapter 2 discusses the baseline inventory of City and community-wide greenhouse gas (GHG) emissions, and proposes an overall goal of reducing communitywide emissions by 15% below 2005 levels by 2020.
- Chapter 3 covers the wide array of emission-reducing Utility programs.
- Chapter 4 describes the Sustainable Purchasing portion of the Plan.
- Chapter 5 discusses Transportation and Sustainable Land Use.
- Chapter 6 covers Green Building.
- Chapter 7 discusses Zero Waste, and
- Chapter 8 on Education proposes strategies for enlisting City employees and the Palo Alto community in carbon-reduction efforts.

In each chapter, the subject area is introduced, baseline emissions quantified where possible, and then goals and actions laid out for Short-Term (2008), Medium-Term (2009-2011), and Long-Term (2012-2020) time frames. At the end of each chapter, the GRTF recommendations for that section are laid out in table format, side-by-side with the recommendations contained in that chapter, with comments regarding differences between the two sets of recommendations. Appendix 1 lists the entire 250 recommendations of the GRTF and correlates them where possible with the proposed actions of the CPP.

This document primarily assumes a forward-looking vantage point. While several activities throughout the City are already underway to achieve Council policy goals that overlap with climate protection issues, this report attempts to identify the costs and benefits of those activities as they apply to greenhouse gases. It also focuses on the continuation of those activities as well as the introduction of new activities for reducing GHG emissions.

Key Findings

Emissions within Palo Alto are estimated at 814,254 metric tons per year. The CPP presents a number of possible actions to consider implementing to meet the City's emission reduction goals. The three primary sources of emissions from Palo Alto are as follows:

> **Transportation Fuels:** Commute emissions, plus other non-commute driving and Air Travel accounts for 333,400 metric tons of CO_2e or 40% of total emissions.

Energy: Natural Gas and Electricity use accounts for 155,016 metric tons of CO_2e or 19% of total emissions

Solid Waste: Emissions from Solid Waste account for 100,304 metric tons of CO_2e or 14% of total emissions.

A variety of possible actions to reduce these emissions are presented in this report. These actions fall into three categories:

Short Term Actions. These are actions that the City should undertake as soon as possible, for completion by July 2009. Generally these actions cost little or no additional funds, are part of existing programs, or can be accomplished with relatively modest effort on the part of staff. For the most part, these actions do not achieve significant declines in emission levels.

Medium Term Actions. These are actions that the City should aim to complete by 2011. With a few exceptions these actions entail moderate marginal cost. Some actions may require a new program for implementation, and most may be accomplished with a modicum of additional staff, resources and/or community effort.

Long Term Actions. These are actions that will require substantial additional resources, considerable staff effort, and substantive community involvement to be effective.

A complete list of proposed actions, and their costs and benefits where known, is included in Appendix II.

Chapter 1: Introduction

Global warming is nearly universally recognized by scientists, and much of the public, as one of the most important threats facing human civilization, and political and military stability. This rise in temperatures has major implications for transboundary migration, economic prosperity, and the future of human development. Locally, the forecasted changes in precipitation accompanying climate change could dramatically reduce the availability of hydro generated electricity, increase the incidence of forest fires, and lead to a rise in the level of San Francisco Bay that will impact Palo Alto's shoreline.

The residents and businesses of Palo Alto clearly recognize the challenges, and appear willing to be part of the solution. In a survey conducted of residents on behalf of the City's utilities, a full 81% of respondents believe that global warming is worse now than a few years ago.[1]

City staff members have also recognized the importance of climate change, and have taken many steps to reduce the emissions of greenhouse gases. For example, the Electric Utility has implemented an innovative and nationally recognized green power program and provided incentives for energy efficiency, among other programs. The Planning Department has implemented incentives for environmental considerations in development, while the Public Works Department is working to decrease the energy demands in public buildings, reduce energy use in the Regional Water Quality Treatment Plant, and reduce the amount of waste that is deposited in the landfill.

Palo Altans can take pride in the efforts of the City and community in reducing greenhouse gas emissions. For example, since 1990, the City government has reduced its energy use by roughly 20% by purchasing and installing energy efficient lighting and LED street lighting, and by implementing energy management systems that optimize state-of-the-art HVAC systems. Also since 1990, emissions from the community from electricity and gas use have declined 13% due in part to more efficient use of energy as well as a decline in economic activity.

Nevertheless, local government, by itself, cannot fully address all of the challenges posed by climate change. Government must act in coordination with, and provide incentives to, the public to fully mitigate the risks posed, and to promote programs and individual behaviors that reduce greenhouse gas emissions. Recognizing the need for coordinated action, former Mayor Kleinberg established in 2006 a Green Ribbon Task Force (GRTF), spearheaded by residents and supported by City staff, to develop a comprehensive list of recommendations to the City and the Community, on ways to reduce greenhouse gas

[1] RKS Research and Consulting, 2006

emissions. The report of the GRTF (CMR: 211:07) delivered in December, 2006 represents far-reaching thinking about new and innovative approaches to solving the climate challenge. Staff has ensured that recommendations of the GRTF are integrated into this Climate Protection Plan.

The first step in implementing a climate protection plan for the City government of Palo Alto and the community it serves is to develop a comprehensive baseline assessment of current emissions. Over the last year, City staff and community members have studied the sources and amounts of greenhouse gas (GHG) emissions from within City limits. This work has included assessments of emissions from energy and fuel use in municipal operations, electricity and natural gas use by the community, road travel within and through Palo Alto, air travel, and commuting to and from Palo Alto. These efforts have been summarized in recent Council reports (CMR 211:07 and *Green Ribbon Task Force Report*).

Council has made Climate Protection a top priority for 2007, and has committed to address climate protection in numerous arenas including:

1. U.S. Mayor's Climate Protection Agreement (CMR 426:06)
2. Sustainability Policy (CMR 260:07)
3. International Council of Local Environmental Initiatives (ICLEI) Cities for Climate Protection Campaign (CMR 426:06)
4. California Municipal Utility Association GHG Reduction Principles (CMR 211:07)
5. Long-Term Electric Acquisition Plan (CMR 158:07)
6. Membership in Sustainable Silicon Valley and Joint Venture Silicon Valley's Climate Protection Taskforce (CMR 266:07)
7. California Climate Action Registry (CMR 169:06)

The goal of this CPP is to present a comprehensive inventory of municipal (City government-generated) and community-generated emissions, identify reduction targets, and propose practical steps to reach those targets. More specifically, the CPP is intended to achieve the following:

1. Analyze the available data on emissions from both municipal and community activities, to present a more comprehensive inventory of emissions from (a) City government operations and (b) community-wide activities
2. Present this inventory as a baseline against which to measure progress towards reducing GHG emissions
3. Develop a set of emission reduction goals for municipal operations over the next year (short term), from years 2-4 (medium term) and from year 5 and beyond (long term) timeframes.
4. Present cost-effective actions for each City department for achieving municipal emissions reduction goals.
5. Present cost-effective actions the City may undertake to help reduce emissions from the Community.

The Climate Protection Plan (CPP) is the next step in a process, continuing on from the GRTF recommendations, by which the City government and the community develop and implement GHG emission reductions and provide leadership in the climate crisis. While the City and the community have much to accomplish, we are not starting from scratch. Municipal staff and the community have already implemented many programs to reduce emissions. Palo Alto is known nationally and internationally as a community of intellectual capital and innovative technology, developing new approaches to solving problems. As a community, Palo Alto has the opportunity to continue its leadership role in finding solutions to the challenges posed by the climate issue.

Cost Benefit Analysis and Budget Implications

The costs of actions to reduce greenhouse gas emissions are a key component of prioritizing which actions to take, in implementing a Climate Protection Plan. This CPP begins the process of estimating the costs of various actions. Some of these costs would be borne by the City, while other costs, either directly or indirectly, could potentially fall on the end user, or the community.

The process of estimating costs of specific CO_2 reductions requires making some assumptions. The assumptions used in this report are described in each chapter's cost benefit section. In some instances, the assumptions use information taken from manufacturers' or other non-peer-reviewed materials and websites, and could not for this study be independently verified. This being the case, the cost benefit analyses should be considered as preliminary only. Additional, more detailed financial and budgetary analyses should be carried out before many of the actions listed here are implemented.

Despite the preliminary nature of these estimates, the analysis does strongly suggest that the City specifically, and the community as a whole, may embark on some significant actions to reduce greenhouse gas emissions at little or no cost. These low-cost actions can be initiated within the next twelve months. Other actions, requiring either greater financial commitment or policy decisions, should be evaluated in the upcoming months by staff which can then make recommendations for expenditures in concert with the FY 2008-2009 budget process. A third group of potential actions represent long term investment and policy changes and require additional study and consideration.

In many cases the changes required to significantly reduce emissions bear significant costs. Many of the actions listed in Appendix II listed here have relatively low cost, but also low benefit. A few, such as reducing the carbon intensity of electricity, have a major impact and can be implemented quickly while maintaining relatively low cost to the City. However, overall, significant investments will be required, especially surrounding waste diversion and the zero waste goals, to achieve significant reductions in emissions.

In many instances, however, the benefits of actions extend beyond the climate change issue. For example, while achieving Zero Waste goals will significantly reduce carbon emissions, it will have other benefits in terms of reduce requirements for landfill space and cleaner air. In another example, adopting green building principals will lower emissions from energy use, but also reduce water demand, improve indoor air quality, and enhance overall standards of living. Including these "auxiliary" benefits into the cost benefit analyses was beyond the scope of this project.

How the Climate Protection Plan fits into other environmental and sustainable efforts

The Climate Protection Plan intersects with and influences many other environmental programs and initiatives. For example, the Zero Waste plan calls for an increase of the diversion rate of several categories of solid waste which will significantly reduce GHG emissions from the community. Another example is the Urban Forest Master Plan. An interdepartmental team has been working to prepare a master plan that addresses the management and expansion of Palo Alto's urban forest. The goal of the Plan is to identify and set forth a comprehensive strategy for management and expansion of both the private and public urban forest, including a preliminary inventory of the publicly-owned urban forest and its carbon trapping capacity. The plan will be completed by summer 2008.

Goal Setting

In each of the following chapters, staff evaluates actions for reducing emissions from several of the sectors comprising City and community GHG sources. To the extent possible, each recommendation is analyzed on a cost-benefit basis.

Staff recommends adopting the following overall goals across City and community operations. These goals are listed below, and correspond with many of the recommendations listed in the Green Ribbon Task Force Report:

1. Set greenhouse gas emissions reduction targets as follows:
    - A 5% reduction from 2005 City emissions levels by July 2009. This would equal a reduction of 3,266 metric tons CO_2e.
    - A 5% reduction in City and Community emissions by July 2012. This would equal a reduction of 39,702 metric tons of CO_2e.
    - A community-wide target of a 15% decrease from 2005 levels by 2020, equal to a reduction of 119,107 metric tons. Achieving this goal would enable Palo Alto to match the State of California's goal of 1990 emission levels by the year 2020 (statewide it is estimated that 2005 emissions were 15% higher than 1990 emissions).

2. Incorporate carbon reduction into the City's Comprehensive Plan goals to ensure continuity with other City priorities, continued action, and a long-term perspective.

3. Explore and evaluate a policy whereby all of the Palo Alto Utilities would become climate neutral and enable customers to choose climate neutrality through various voluntary mechanisms.

4. Use this Climate Protection Plan as a springboard for determining GHG-reducing actions to take over the next few years. It should be revisited and action steps reformulated at least biennially.

5. Maintain and report GHG inventories on a regular basis including:

- Conducting regular community-wide GHG emission estimates using methodological advances to improve the estimates presented here.
- Conduct annual municipal operations GHG emissions inventory.
- Continue to certify electric utility emissions with California Climate Action Registry (CCAR) or with a suitable reporting system recognized by the State of California.

6. Promote participation by Palo Alto businesses in inventory efforts: CCAR, SSV (Sustainable Silicon Valley), JVSVN (Joint Venture Silicon Valley Network), SVLG (Silicon Valley Leadership Group) or other organization). This includes participation by vendors and joint action agencies with which Palo Alto interacts (Northern California Power Agency, Transmission Agency of Northern California, Palo Alto Solid Waste Collection and Hauling agreements, etc.). These efforts should include:

    - Participating in regional efforts to promote consistent, science-based, reasonable, and transparent GHG inventory accounting.

    - Working with ICLEI, California Climate Action Registry, California Air Resources Board, US EPA and other broad based organizations who are working on developing new approaches to estimating emissions from refuse (landfills, recycling, composting) activities, water treatment, natural gas distribution systems, and other pertinent and applicable municipal operations.

    - Helping to refine science for estimating unmeasured sources; fugitive methane from landfills and gas distribution, sequestration and sinks, regional transportation, air travel, embodied emissions in purchased products, etc.

    - Developing methodology using SAP or other tools/systems for tracking and for regulatory compliance and tracking municipal purchases for emissions modeling.

    - Preparing systems for completing municipal inventories of non-CO_2 emissions.

    - Identifying and tracking long-term methodology and metrics for measuring progress (e.g. total, net, per-square-foot, per capita, per unit GDP, etc.).

Monitoring

The City will measure its overall progress in reducing GHG emissions by:

- Completing the California Climate Action Registry inventory, or similar inventory, every two years.
- Updating International Consortium of Local Environmental Initiatives inventory for community-wide emissions every two years.
- Monitoring the effectiveness of actions undertaken on an annual basis.

Table 1.1 Baseline Green Ribbon Task Force Recommendations in comparison with Baseline Palo Alto Climate Protection Plan Actions

GRTF Baseline Recommendations	CPP Baseline Actions
Knowing the starting point helps identify and prioritize opportunities	This CPP analysis presents more detailed analysis of cost effective actions and prioritizes opportunities for the city and the community.
No uniform accepted baseline methodology for cities.	CPP used best practice analysis to emissions estimating Methodology for Palo Alto, borrowing approaches from CCAR, ICLEI and the US EPA.
Would be improved with more frequently updated Palo Alto-specific data	CPP does not specifically address issue of Palo Alto-specific data.
Apply targets to government, corporations, or even individuals	CPP provides a comprehensive analysis of emissions from more sources than are commonly used in performing inventories. Additionally, CPP provides recommendations and cost effective measures on how to reduce emissions for Palo Alto government, corporations and individuals.
Measuring changes instead of totals often easier with greater accuracy	CPP provides data for the community and municipal government to compare progress overtime by providing details on methodology used to complete assessment.

Chapter 2: Greenhouse Gas Emissions Estimates

Overview

According to the US Environmental Protection Agency, the average American emits 23 metric tons of carbon dioxide into the environment every year; 10 metric tons related directly to driving, home activities, and air travel, and 13 metric tons related to the purchase of products and services. Overall, each person emits 140 pounds of carbon dioxide per day.

Per capita CO_2 emissions in California are estimated by the California Energy Commission to be approximately 11 metric tons per year. In California, GHG emissions are dominated by carbon dioxide, mostly from combustion of fossil fuels, followed by nitrous oxide, then methane, and then the remaining "high global warming potential" gases, chlorofluorinated refrigerants and sulfur hexafluoride. California GHG emissions by GHG and by end-use sector are illustrated in Figure 2.1 and Figure 2.2.

The greenhouse gas of key concern is carbon dioxide (CO_2). GHGs other than CO_2 can be converted to "CO_2 equivalent" (CO_2e) by multiplying the mass of that gas by the "global warming potential" (GWP), which indicates the equivalent greenhouse effect of a pound of the gas as compared to a pound of CO_2. Throughout this report, references to greenhouse gas (GHG) emission quantities follow the international convention of using metric tons (2205 pounds) of CO_2 or "CO_2 equivalent" when referring to non-CO_2 greenhouse gases. Sometimes pounds are used when those units are more illustrative. The key GHGs of interest are listed below in Table 2.1 along with their respective global warming potentials.

Table 2.1. Key Greenhouse Gas Global Warming Potentials

Gas	Symbol	Global Warming Potential (IPCC Second Assessment Report)
Carbon Dioxide	CO_2	1
Methane	CH_4	21
Nitrous Oxide	N_2O	310
Hydrofluorcarbons	HFCs	140-12,100
Perfluorocarbons	PFCs	6,500-9,200
Sulfur Hexaflouride	SF_6	23,900

Per capita Palo Alto emissions (not including municipal operations-generated emissions) are estimated at 14 metric tons, or 26% above the statewide average. This higher level of emissions is not necessarily an indication that an average Palo Altan actually emits more greenhouse gases than the average Californian. Rather, it indicates that this inventory includes emissions, both direct and indirect, which may not be included in some other inventory approaches.

Figure 2.1. Sources of California's 2004 GHG Emissions by Sector

Source: California Energy Commission

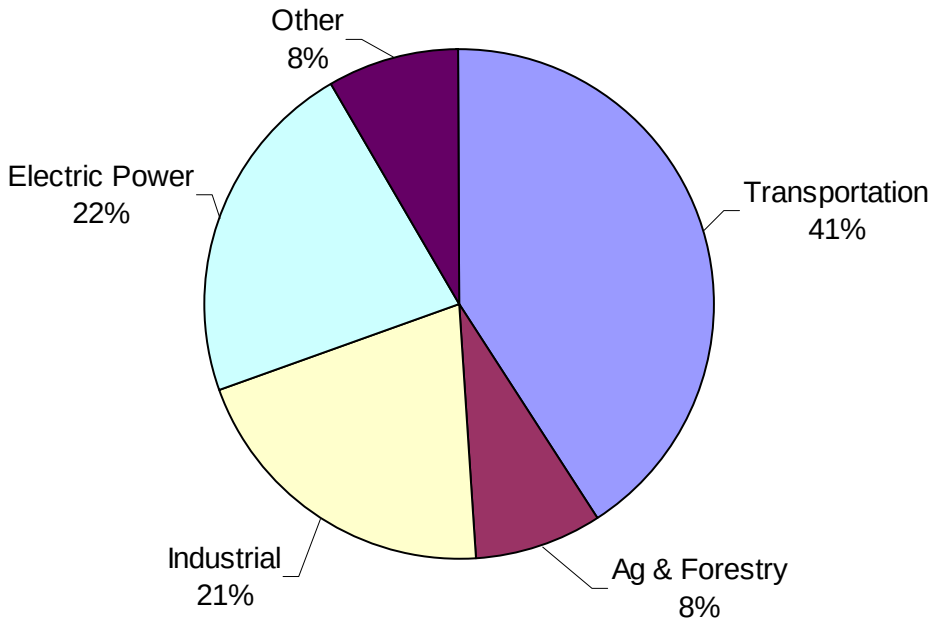
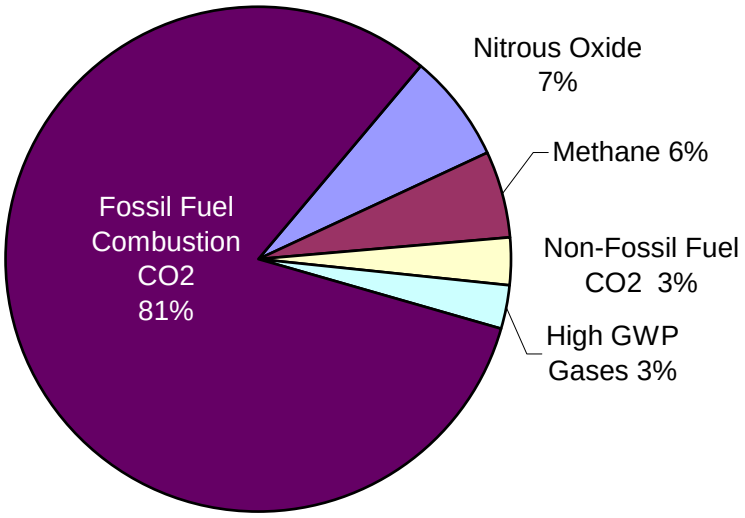


Figure 2.2. California GHG Gas Composition in 2004

Source: California Energy Commission



Approach to Assessing Emissions

In this report, staff has attempted to complete a more comprehensive assessment of emissions from both City operations (municipal) and the Palo Alto community as a whole than most other cities have attempted. This assessment includes some sources of emissions not included in other inventories, such as emissions generated outside Palo Alto and even outside the United States, as part of "upstream" emissions from the manufacture of products used but not produced in Palo Alto. By including these sources, we have attempted to account for emissions that are a result of our actions, behaviors and purchasing decisions which we can indeed influence. In a global perspective, we "own" those emissions no matter where they are generated. We as a community **should** account for them, even if current emissions reporting protocols do not extend to this level.

Municipal Emissions Profile. City operations contribute to greenhouse gas emissions through three primary avenues:

1. Energy
    a. The use of electricity and natural gas to power and heat City buildings and facilities.
    b. The use of gasoline, compressed natural gas, diesel fuel and other fossil-based fuels to power vehicles, equipment, compressors and other machinery. This includes the emissions of vehicles from the Palo Alto Landfill and Regional Water Quality Plant.
    c. Emissions associated with losses in the electric and gas transmission and distribution systems (which serve the entire community).
2. Materials & Services
    a. Emissions associated with the manufacture, use, and disposal of a wide variety of products such as paper, electronics, toner cartridges, and equipment.
    b. Outsourced services that use fossil fuels from City fueling stations.
3. Community Refuse and Wastewater Services
    a. Emissions from the Palo Alto landfill (which serves the entire community) but not including the use of vehicles which are included in 1b above.
    b. Emissions from wastewater treatment at the Palo Alto Regional Water Quality Plant (which serves several communities) but not including the use of vehicles which are included in 1b above.

Palo Alto has CO_2 "sinks," as well, such as City-owned trees, which can absorb CO_2. Given the framework of this Plan, these sinks are not included. The City is working actively to manage its forest resources in open spaces and is currently working on a revised Urban Forestry Master Plan. Staff recommends that future reports and updates include the impact of municipal and community actions to increase biotic sinks and sequestration impacts and coordinate the Climate Protection Plan actions with those of the Urban Forestry Master Plan.

Community Emissions Profile. The Palo Alto community - businesses, residents and workers produce greenhouse gas emissions in a wide variety of ways. These include:

1. General economic and domestic activity which consumes electricity and natural gas to power and heat homes and businesses.
2. Non-commute travel, including errands, business, vacations, shipping, and air travel.
3. Commuting by residents to their job within and outside of City limits, and by non-residents commuting into the City for work. In this way, the "community" of Palo Alto includes workers who come to the City for employment, but do not reside within city limits.
4. Production of waste material which, when landfilled, decomposes and in the process produces methane, a potent greenhouse gas.
5. Production of new materials and disposal of materials that could be recycled.

Calendar year 2005 has been selected as the "baseline" reference year, as it is the first year for which certified estimates have been completed.

A key element in this analysis is the inclusion of "upstream" emissions as well as "downstream" emissions. Understanding the differences between these emissions types is critical in understanding both the methodology of this report, as well as the results and conclusions drawn. Downstream emissions are those which are released as the result of a particular activity. For example, downstream emissions include the discarding of materials into a landfill which in the process of decomposing creates CO_2, methane, or other greenhouse gases, or the leakage of refrigerants into the atmosphere from old appliances. The ICLEI model focuses on downstream emissions.

Upstream emissions are those generated by the manufacture and transportation of products to Palo Alto. In this report, upstream emissions are included for items which are discarded into the waste stream but which are recyclable. The upstream emissions represent the difference between the additional emissions which are generated by the making of a new item compared to the emissions generated by recycling the item. For example, 15.7 tons of CO_2 emissions are produced in the production of one ton of new aluminum cans, as opposed to 2.2 tons CO_2 emitted in recycling a ton of aluminum cans (EPA 2006). The difference, 13.5 tons, is included in the emissions inventory for non-recycled aluminum cans as an upstream emission.

The analysis presented below is based on three primary approaches to measuring emissions.

1. California Climate Action Registry. For the municipal baseline estimates associated with energy use, staff used the protocols from California Climate Action Registry (CCAR). This State recognized registry provides municipalities and organizations a methodology for measuring emissions primarily associated with energy use. The data used in this report were those reported to CCAR as the City's 2005 baseline emissions inventory.

2. ICLEI. For much of the other non-energy sources of emissions from the City, staff used the protocols designed by ICLEI, the International Council for Local Environmental Initiatives. These protocols are embodies in ICLEI's Clean Air and Climate Protection (CACP) Software, which was used in this analysis. The ICLEI climate protection protocol is being used by over 800 cities and local governments around the world, including over 20 in the Bay Area. The ICLEI approach has the advantage of comparability between cities, allowing municipal staff and residents to compare emissions profiles of similar communities. However the ICLEI approach does have some limitations and does not consider many types of emissions from the community which are critical to obtaining a complete community-wide emissions profile. These omissions include emissions from municipal purchases of office supplies, as well as emissions associated with the manufacturing of materials which are discarded by the community instead of being recycled.

3. US EPA. Because of the ICLEI limitations, staff used the US Environmental Protection Agency's Life Cycle Assessment of Emissions and Sinks for emissions factors when the ICLEI Model did not include those elements.

Table 2.2 presents the details of the emissions inventory, identifying for each emissions source whether the ICLEI or the EPA model was used, as well as the data source and conversion factor used.

In addition to the CCAR, ICLEI, and EPA protocols, staff has employed the following additional resources in developing a baseline of Palo Alto emissions:

1. Transportation estimates are based on the Mayor's Green Ribbon Task Force assessment of transportation vehicle-mile, vehicle mix, fuel sales, and commute data from the U.S. Census Bureau, Bay Area Air Quality Management District, Metropolitan Transportation Commission, California Department of Motor Vehicles, and State Board of Equalization.
2. Estimates related to materials and solid waste are based on landfill emissions factors from the California Air Resources Board (CARB), direct source-testing measurements at the Palo Alto Landfill, the US Environmental Protection Agency's *Solid Waste Management and Greenhouse Gases Report Edition 3*, and use of ICLEI's "Clean Air and Climate Protection Software".
3. Assessment of the component emission factors associated with purchases by the City were carried out using data from the US EPA WARM model, as well as anecdotal data from the Pew Center on Climate Change, "The Green Guide" of the National Geographic Society, Silicon Valley Toxics Coalition, Indiana Recycling Coalition, and Green Office Products Program of United Kingdom[2].

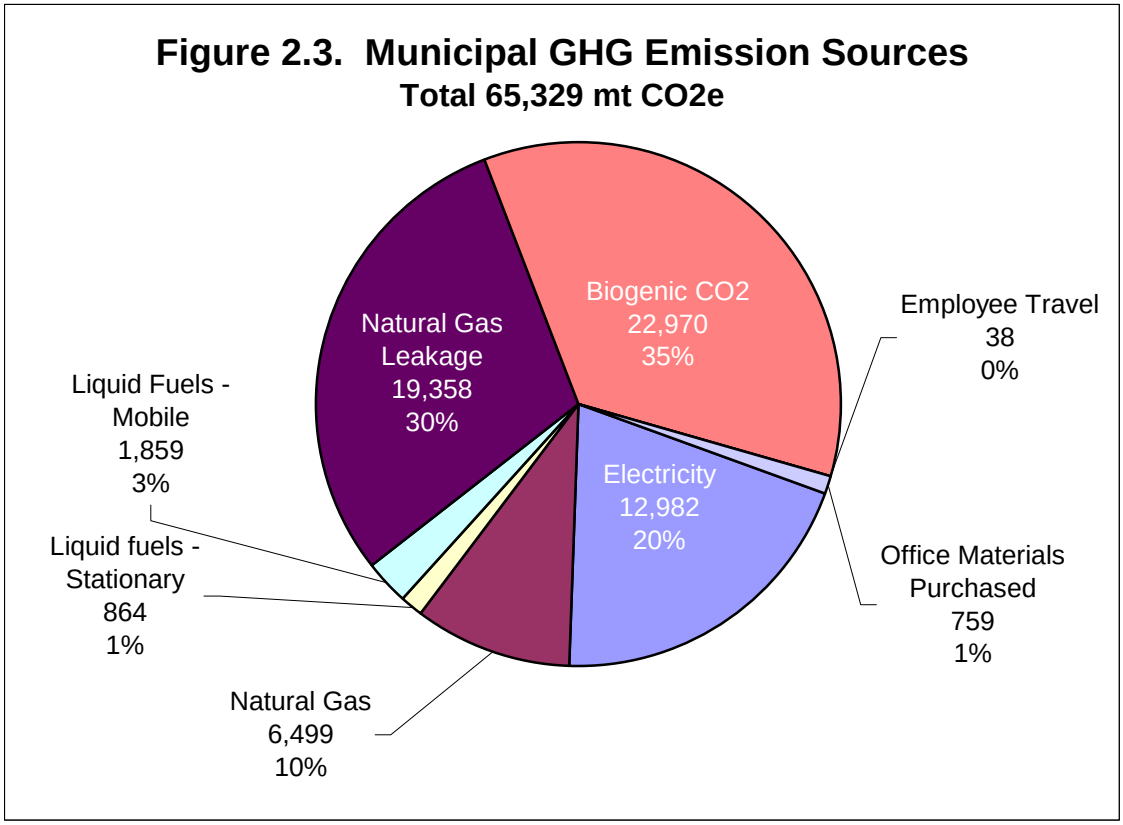
[2] Other sources include: *Eco-Efficiency in Industry and Science series from Kluwer Publications: Computers and the Environment, edited by Ruediger Kuehr and Eric Williams. Research conducted at the United Nations University, and Organization for Economic and Cooperative Development. Working Party on Pollution Prevention and Control. Extended Producer Responsibility: A Guidance Manual for Governments. October 2000.*

Baseline Emissions Estimates

Municipal and community-wide emissions estimates are listed in Table 2.2. The results indicate that total baseline emissions for the municipal and community combined is 794,049 metric tons of CO_2e, or approximately 14 tons per resident. Of that total, municipal emissions contributed 65,329 metric tons of CO_2e which include emissions from energy use, biogenic sources, fugitive sources, employee travel, fuel use, and some office purchases. Community emissions are approximately 728,720 metric tons of CO_2e per year, which include emissions from electricity and natural gas use, transmission and distribution losses, commuting into and out of Palo Alto, non-commute ground travel, air travel, landfill emissions, and upstream emissions from recyclable materials left in the waste stream. One emissions source, leakage of methane from the Palo Alto Landfill, is subject to considerable debate, and different methodologies show a high degree of variability. Currently, an external consultant has been retained to carry out a detailed study. The results from that study are not yet released.

Emissions of greenhouse gases from City operations and City-managed facilities are presented in Figure 2.3. Municipal use of electricity, natural gas, and liquid fuels emit about 22,242 tons of CO_2e per year. Flaring collected landfill gas and incinerating wastewater sludge account for another 43,185 tons of biogenic CO_2 (not reported under IPCC protocols). City purchases account for at least 759 tons of CO_2e. One major suspected source of "fugitive" methane emissions is included which involve leaks in the utilities' natural gas distribution system. The amount of emissions from such leaks is very difficult to estimate accurate. The total of 65,329 metric tons of CO_2e includes taking a conservative approach to the variability of fugitive emissions.

Continued refinement on the methodology for determining fugitive emissions is clearly worthwhile. Nitrous oxide and high GWP gases have not yet been estimated. In addition, sequestration such as trees have not yet been incorporated.



CCAR does not include emissions associated with manufacture and disposal of supplies and materials, but there are tools that can help in illuminating what those emissions may be. These indirect emissions arise from both the energy it takes to make something and the downstream effects when it is disposed of, whether landfilled, or reused or recycled. Municipal purchases of paper, toner and electronics are estimated to contribute approximately 739 metric tons of CO_2e to overall municipal emissions. The actual impact of all City purchases is likely to be much greater than that stated here. Of the products tracked, the City's purchases of electronics (computers, monitors and copiers) contribute around 550 metric tons of CO_2e each year. The use of paper by the City is the second largest contributor at 210 metric tons of CO_2e. Other tracked municipal purchases as well as staff travel contribute small amounts to the City's total.

The community's emissions (Figure 2.4) far outstrip those of City government, totaling nearly 730,000 metric tons CO_2e. The largest contributors to community GHG's are the non-commute use of vehicles, and natural gas and electricity use. Other primary contributors include landfilling of recyclable and compostable materials, air travel, and commuting.

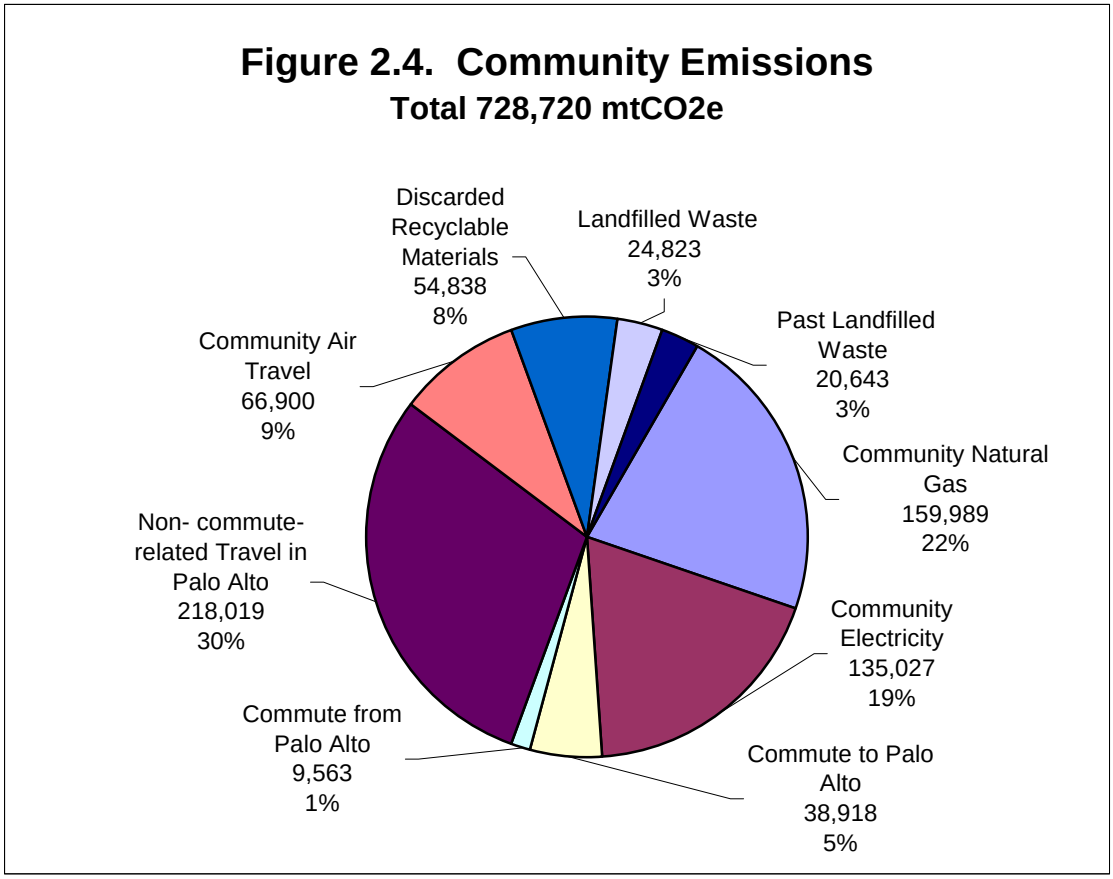


Figure 2.4. Community Emissions
Total 728,720 mtCO2e
Discarded Recyclable Materials 54,838 8%
Landfilled Waste 24,823 3%
Past Landfilled Waste 20,643 3%
Community Natural Gas 159,989 22%
Community Electricity 135,027 19%
Commute to Palo Alto 38,918 5%
Commute from Palo Alto 9,563 1%
Non- commute-related Travel in Palo Alto 218,019 30%
Community Air Travel 66,900 9%

Figure 2.5 presents the upstream emissions factors associated with those discarded items. Interestingly, paper is the single largest contributor at 9,955 tons of waste, or at over 31,000 metric tons of CO_2e and nearly 60% of total community emissions from disposal of recyclable or compostable materials in the landfill. Eliminating all recyclable materials from the waste stream would reduce total emissions from the community by nearly 8%, and would be equivalent to taking nearly 10,060 cars off the road each year.

Figure 2.5. Upstream Emissions from Unrecycled Items Disposed of into the Waste Stream (54,838 metric tons CO2e)

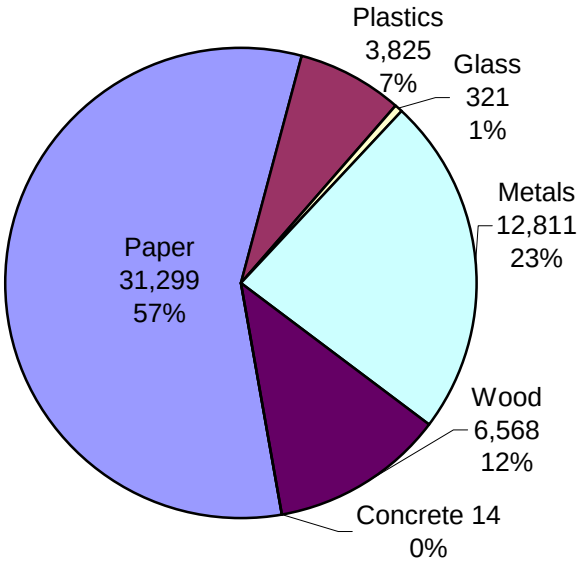


Table 2.2. 2005 Baseline Greenhouse Gas Emission Estimates from Municipal and Community Sources

	Emissions Source	CO_2e (metric tons = 2205 lbs)	Data Sources
City Emissions			
City Fossil Fuel Use			
Electricity Consumption	Electricity (kwh)	12,982	CMR211:07 (CCAR). Includes distribution and transmission losses.
Natural Gas	Gas (MMBtu)	6,499	CMR211:07 (CCAR)
Liquid Fuels – Stationary and Off Road	Includes diesel, biodiesel (B20) and gasoline	864	CMR211:07 (CCAR)
Liquid fuels - Mobile	Includes gasoline, diesel	1,859	CMR211:07 (CCAR)
Employee Travel	Air Travel and ground transport	38	Employee travel was estimated by taking a sample of travel expense reports and determining distances. A sample of 25 reports was used in this estimate, which totaled $15,158 out of a total of $281,100 spent on travel in FY 06/07. This sample showed 9,212 air miles and 1664 estimated driving miles. An additional sample of 20 reports will be available on 9 Sept. These data will be included into this estimate.
Total Municipal Emissions from Using Fossil Fuels		**22,242**	CMR211:07 (CCAR)
Fugitive Sources			
Compressed Natural Gas (CNG) System leakage		3	CCAR
Natural Gas Distribution Leakage		19,355	Range: 6,350 to 19,355. Low estimate based on ½ % of sales. High estimate based on purchases minus sales.
Total Fugitive Emissions		**19,358**	

	Emissions Source	CO2e (metric tons)	Data Sources
Biogenic Sources			
Landfill Gas Flaring		5,853	CCAR
Wastewater Sludge Incineration		17,117	This serves the entire community, but is placed under municipal emissions.
Total Biogenic		**22,970**	
Other Municipal Emissions			
City Purchasing			
Paper Use	19,335 average number of reams purchased	210	Assumes 30% recyclable content for 8.5 x 11 office paper and 0% recyclable for other paper sizes.
Electronics	2061	546	Source: Recycling program of Indiana http://www.escrapindiana.org/environmentalben.html Manufacturing one computer and monitor uses at least 530 pounds of fossil fuels, 50 pounds of chemicals and 3,330 pounds of water . In addition, 81% of the energy used by a computer over its lifetime is used in the manufacture of the product, before the computer ever reaches the home or office.*
Toner Cartridges	223	2	Toner purchases from Purchasing and IT divisions. 1 cartridge – 23.1 lbs of C02; Source:the green guide.com
Ink Jet Cartridges	505	1	Cartridge purchases from Purchasing division. CO_2 impact from www.first impressionslast.com, a green provider of office supplies
Total Tracked City Purchases		**759**	
TOTAL TRACKED MUNICIPAL		**64,901**	

	Emissions Source	CO_2e (metric tons)	Data Sources
Community Emissions			
Waste Production			
Annual emissions from one year of Waste Production into Landfills		24,823	Annual lifecycle emissions from one year of waste – CPAU Emissions from annual waste production utilizing ICLEI CACP software protocol.
Methane Production from Past Palo Alto Landfill use		20,643	ICLEI Note range= 5,068 - 55,049. Low estimate based on flare station measurements and assumes 85% efficient LFG collection. High estimate from ICLEI workshop on 7 September using ICLEI CACP software. *Estimate used is data from ICLEI landfill gas report (2006*).
Total Emission from Landfill		**45,466**	
Recycled Products into Landfill - Upstream Emissions			This represents the difference in emissions between recycling these materials as opposed to producing products from virgin materials.
Paper	9955 tons in waste stream	31,299	EPA 2006 and 2006 Waste Composition Study
Plastic	2,236 tons in waste stream	3,307	EPA 2006 and 2006 Waste Composition Study
Plastic Bags	306 tons in waste stream	518	EPA 2006 and 2006 Waste Composition Study
Glass	1,147 tons in waste stream	321	EPA 2006 and 2006 Waste Composition Study
Aluminum Cans	113 tons of Aluminum in waste stream	1.537	EPA 2006 and 2006 Waste Composition Study
Mixed Metal	2,373 tons of metal in waste stream	11,274	EPA 2006 and 2006 Waste Composition Study
Concrete	1,383 tons of concrete in waste stream	14	EPA 2006 and 2006 Waste Composition Study
Wood	2,670 tons of wood in waste stream	6,568	EPA 2006 and 2006 Waste Composition Study
Total Upstream Emissions		**54,838**	

	Emissions Source	CO_2e (metric tons)	Data Sources
Community Energy Use			
Electricity Consumption	Electricity (kwh)	135,027	CMR 211:07 CCAR
Natural Gas Use	Natural Gas (MMBtu)	159,989	CMR:211:07 CCAR
Total Community Energy Use		**295,016**	
Community Transportation			
Commute within town	Gasoline and diesel	671	Estimates from GRTF Transportation Subcommittee Palo Alto ABAG Commute Data file
Commute into Palo Alto	Gasoline and diesel	38,918	Estimates from GRTF Transportation Subcommittee. Palo Alto ABAG Commute Data file. 50% of total commute into Palo Alto
Commute from Palo Alto	Gasoline and diesel	9,563	Estimates from GRTF Transportation Subcommittee. Palo Alto ABAG Commute Data file 50% of total commute out of Palo Alto
Non Commute Palo Alto Road Transportation total	Gasoline and diesel	217,348	Estimates from GRTF Transportation Subcommittee. Palo Alto ABAG Commute Data file.
Palo alto air travel	Aviation fuel	66,900	Estimates from Data from GRTF – Transportation Subcommittee
Community Transport		**333,400**	
TOTAL COMMUNITY		**728,720**	
TOTAL MUNICIPAL AND COMMUNITY		**793,621**	At population of 58,598, equals per capita emissions of 13.5 tons

Chapter 3: Utilities

Overview

This chapter describes the major utility program areas that address climate protection, both mandatory and discretionary. Many of the programs began prior to the development of a climate protection plan, but had environmental protection, including greenhouse gas (GHG) reduction, as a key impetus. Existing and new programs are described in this chapter, with quantitative estimates of greenhouse gas reduction potential associated with each major area, where possible.

Electricity and natural gas account for approximately half of the estimated GHG emissions from the community as a whole. For base year 2005, electric emissions were 145,000 metric tons of CO_2, and natural gas emissions were 165,000 metric tons of CO_2.

The key highlights of this chapter are that it proposes to:

1. Define "climate neutral" as it applies to Utilities
2. Pursue alternatives to reduce the carbon intensity of the natural gas portfolio
3. Promote the deployment of local solar energy resources
4. Facilitate and encourage voluntary emission reductions by customers
5. Support GHG-related research, development and education
6. Adopt a GHG adder of $20/metric ton in utility purchasing decisions

Goals and Actions

To meet its reduction targets, Utilities intends to pursue the recommendations formulated by the Energy Subcommittee of the Green Ribbon Task Force (GRTF):

> "Reduce greenhouse gas emissions from electricity and natural gas usage to achieve climate neutrality by 2020 by doing all of the following:
>
> 1. Reduce electricity and natural gas use through conservation and energy efficiency
> 2. Reduce carbon intensity of energy supply provided by Utilities
> 3. Expand use of renewable energy installed or purchased directly by customers
> 4. Participate in and promote greenhouse gas emissions inventory tracking and reporting
> 5. Promote and implement climate-neutral alternatives and education
> 6. Employ urban forest opportunities to reduce energy use and increase carbon sequestration
> 7. Invest in GHG-reducing projects or offsets to balance remaining emissions
> 8. Support research and development in GHG-reducing science and sociology
> 9. Coordinate energy-related climate activities with building and urban planning activities
>
> 'Climate Neutral' in this context does not necessarily mean zero emissions, but as close as is feasible and practical, similar to the goals of the Zero Waste Strategic Plan."

Should "Climate Neutral" mean mandatory inclusion for all utilities customers, or does it apply only to programs that enable a customer to choose to be climate neutral? Staff recommends a combination of both mandatory and optional programs, so that Utilities (a) reduce community-wide emissions from electricity and natural gas by at least 15% from 2005 to 2020, and (b) establish programs that enable customers to choose a climate neutral option for both electricity and natural gas (currently only offered for electric – Palo Alto Green).

The GRTF also had several recommendations regarding GHGs related to energy use associated with water use. However, as described in the April 23, 2007 staff report (CMR:211:07), GHG emissions from water use in Palo Alto are extremely small due to the gravity-fed nature of the water supply. Staff will continue to implement water conservation measures in existing buildings and in new construction, but these programs are not anticipated to yield significant direct reductions in GHG emissions. Key opportunities related to wastewater treatment, however, are included here.

Utilities' planned and existing programs for implementing the GRTF recommendations are described in detail below.

1. Reduce electricity and natural gas use through conservation and energy efficiency
Implementing the Council-approved 10-year efficiency plan, extrapolated to 2020, will reduce energy consumption by an estimated 43,300,000 kWh per year and 1,380,000 therms per year, which is equivalent to more than half of the otherwise projected load growth in electricity and nearly all of the load growth for natural gas. This translates to 15,800 metric tons from avoided fossil fuel to generate electricity (at .805 lb/kWh) and 7,300 metric tons from avoided natural gas use (at 11.7 lb/therm). The key elements of the plan are as follows.

- Implement new construction incentives to dovetail with Green Building Policy and associated programs
- Support energy code research and updates to implement local requirements in harmony with Green Building Policy and associated programs
- Expand custom rebates for commercial customers to spur innovative retrofit and "replace-on-burnout" measures by customers
- Solicit third-party "efficiency bidding" programs to spur cost-effective innovation in program design and implementation. Third-party efficiency programs deliver energy savings implemented by specialists that are customized to customer needs that are not practical to implement through conventional rebate incentive programs.
- Expand targeted programs to pursue high-yield areas (Data Centers, Motors, Air Compressors, Restaurants, etc.)
- Hire Measurement and Verification (M&V) contractor to verify and track efficiency impacts.
- Support efforts to increase efficiency of supply (e.g. improved hydro runners, lower system losses in the electric distribution system or jointly-owned electric transmission facilities, etc.)
- Investigate role for demand response and energy storage in reducing GHG emissions, such as reducing impact and cost of keeping grid reliable with increasing intermittent renewable resources.

- Evaluate energy efficiency opportunities at municipal government facilities. Develop a ranked set of energy efficiency and conservation measures with associated costs, benefits and greenhouse gas reduction implications. Recommend strategies and schedules for implementing all cost-effective efficiency measures.
- Develop a methodology to give recognition and to reimburse back to departmental budgets at least 50% of achieved utilities energy bill savings.
- Recommend strategies and schedules for implementing cost-effective efficiency measures, subject to budget availability to make these changes.

In addition, Utilities will evaluate and implement, where feasible, retail rates that encourage conservation and efficient use of resources. Reduction potential for retail rates has not yet been evaluated. Utilities will:

- Evaluate time-differentiated rates and implement where feasible;
- Evaluate modifications to tiered rate structures and implement where feasible; and
- Evaluate special rates for electric transportation or other environmentally-preferred technologies and implement where feasible.

2. Reduce Carbon Intensity of Energy Supply Provided by Utilities

Utilities will expand the use of non-fossil energy sources by implementing the existing Renewable Portfolio targets included in LEAP, exploring local renewable energy project opportunities, and pursuing non-fossil alternatives to natural gas for a portion of the natural gas supply portfolio for retail end-use. Specific action items include:

- Meet or exceed Renewable Portfolio Standard (RPS) targets (at least 33% by 2015 with less than a $0.5 ¢/kWh rate impact). The 0.5 ¢/kWh rate impact limit amounts to an additional $5 million per year. Eligible renewable energy comprised eight percent of purchases in 2005. One-third of annual electricity supply at zero emissions compared to conventional electricity translates to 120,500 metric tons saved compared to the 2004 starting point of 0%, which translates to $40/metric ton saved. The increase from 8% to 33% translates to 91,000 metric tons CO_2 saved per year. The original targets were determined based on Utilities customer preferences and not solely on GHG reduction potential, and staff is working to meet the targets at far less than the allowed rate impact limit.
- Develop short-term renewables market with wholesale suppliers of electricity and natural gas, in order to help meet seasonal and shorter-term needs.
- Continue participation in the Northern California Power Agency's Green Power Pool to meet a portion of RPS targets through joint action.
- Evaluate and, if feasible and economic, install a municipal hydro energy recovery system, which would extract energy from water flowing downhill between reservoirs in Palo Alto's municipal water system. Estimated savings are 485,000 kWh per year, or 180 metric tons per year reduction.
- Evaluate the feasibility and cost effectiveness of portfolio targets for non-fossil alternatives to natural gas (e.g. biogas).

In addition, Utilities will promote high-efficiency and ultra-clean fossil-fueled power generation at customer sites and ensure that local and long-term electricity resources outperform statewide GHG emissions limits on long-term electric power contracts. Utilities will:

- Implement the PLUG-In incentive program for cogeneration, fuel cells, waste heat recovery, and local renewables. The program maximum capacity of 20 MW would meet approximately 15% of annual energy needs, with an expected net decrease in CO_2 emissions of 20,000 metric tons per year.
- Ensure compliance with limitations on long-term electricity contracts of no more than 1,100 lb/MWh, as prescribed in state law enacted under senate bill SB1368.

3. Expand Use of Renewable Energy Installed or Purchased Directly By Customers

Utilities will continue to offer voluntary retail rates whereby customers can choose to purchase non-fossil energy sources for electricity, and will develop a similar program for natural gas. Utilities will:

- Utilize Renewable Energy Credits for PaloAltoGreen when short on RPS targets
- Increase City government participation in Palo Alto Green from the current 3% level to 5% by 2010 and 10% by 2020. The RWQCP may need to involve all jurisdictions for whom wastewater is treated. Annual electricity use at the RWQCP is 17 million kWh, and other municipal government use is 13 million kWh. Each 1% of subscription to PaloAltoGreen amounts to approximately $2,550 per year for the RWQCP and $1,950 for the rest of City government, with estimated CO_2 reductions of 62 and 47 metric tons per year, respectively.
- Increase PaloAltoGreen to 5% of load by 2010 and 10% of load by 2020, through continued growth of the program. Ten percent of electric supply with zero GHG emissions compared to conventional electricity at .805 lb/kWh would amount to a reduction of 36,500 metric tons of CO_2.
- Develop and implement a voluntary retail program similar to PaloAltoGreen for low-greenhouse gas alternatives to natural gas, such as biogas. Achieving the same 20% participation rate as PaloAltoGreen would translate to ten percent of natural gas consumption with a reduction of 16,400 metric tons of CO_2 per year.

In addition, Utilities will continue to aggressively promote the use of solar energy, by implementing the existing PV Partners program, and implementing solar thermal incentive programs that were described in the Council-approved Ten-year Energy Efficiency Portfolio Plan. The key elements of the solar plan are as follows:

- Implement PV Partners program to support state-wide goals of California Solar Initiative and SB1. The current ten-year program plan is sufficient to provide incentives for up to 6,544 kW of photovoltaics, which would generate approximately 10,500,000 kWh per year, or about 1% of annual sales, reducing GHG emissions by 3,800 metric tons.
- Facilitate expanded use of solar power for PaloAltoGreen, including local solar and lower-cost wholesale solar power. The impact of this action is uncertain, but is expected to increase deployment of solar energy systems that otherwise would not be built.
- Develop and implement solar hot water and space heating incentive program, consistent with recently-enacted assembly bill AB1470 and the California Solar Initiative solar water heating pilot program. Target 500 residential systems equivalent, with estimated savings of 500 metric tons per year.

- Develop and implement solar pool & spa heating program. Target 100 pools (there are about 4,000 in Palo Alto), with estimated savings of 1,000 metric tons per year.

4. Participate in and Promote Greenhouse Gas Emissions Inventory Tracking and Reporting

Staff recommendations regarding GHG inventory and tracking are discussed in Chapter 2. In addition, Utilities will continue it current efforts related to estimating and understanding emissions from non-CO_2 GHGs such as SF_6 and methane, whether man-made or biogenic, including the following actions:

- Expand reporting to include all six Kyoto GHGs.
- Estimate methane emissions from gas distribution and develop mitigation plan.
- Refine science and participate in protocol development for estimating emissions from refrigerants, SF_6, and non-fossil fuel sources such as landfill operations and wastewater treatment

5. Promote and Implement Climate-Neutral Alternatives and Education

Utilities will employ best practices in its own purchasing decisions and support sustainable purchasing polices. Utilities will employ a GHG adder in accordance with the California Municipal Utility Association (CMUA) GHG Emissions Reduction Principles (CMR:315:06), in order to internalize the potential financial risk associated with long-term greenhouse gas liabilities. In addition, Utilities will:

- Ensure that appropriate avoided costs are included in energy efficiency evaluation criteria to use in life-cycle costing for all utility equipment
- Specify EnergyStar appliances and energy consuming equipment, if available, in municipal purchases
- Employ a $20/metric ton GHG adder in purchasing evaluation, increasing by 5% per year starting in 2008. The adder will be applied to purchases that are not mandated or otherwise undertaken to meet other policy directives, and shall be utilized until allowance allocations, cap and trade, or other regulations are implemented that internalize the cost of GHG in utility operations. The proposed adder reflects the financial risk of future emissions regulation, not an estimate of environmental costs. Investor-owned utilities such as PG&E are currently required to use a carbon adder of approximately $10/ton of CO_2. The proposed $20 adder for Utilities is based on the same methodology used to determine the investor-owned utility adder, but with Palo Alto discount rates and updated information on emissions allowance costs. An example adder of $20/metric ton of CO_2 translates to roughly 1 ¢/kWh, 12 ¢/therm, and 20 ¢/gallon of gasoline, meaning that cost tradeoffs would treat these fuels as if they actually cost a little bit more.

Utilities will expand its efforts to mitigate emissions from all six Kyoto GHGs, whether man-made or biogenic, including the following actions:

- Seek to eliminate SF_6 from utility infrastructure where feasible as high-voltage equipment is replaced and as equipment becomes available
- Explore long-term alternatives to landfill and wastewater treatment operations to reduce methane emissions based on refined emissions estimates

6. Employ Urban Forest Opportunities to Reduce Energy Use and Increase Carbon Sequestration

Utilities will:

- Participate in American Public Power Association's "Tree Power" program. Promote use of shade trees that reduce energy use and trap carbon as an extension to the "Right Tree in Right Place" program, using a mix of education and financial incentives, and coordinating with the Urban Forest Master Plan

7. Invest in GHG-Reducing Projects or Offsets to Balance Remaining Emissions

Utilities will explore CO_2 reduction projects, allowance, and offsets to balance any remaining GHG emissions after all efficiency and supply alternatives have been exhausted. Specifically, Utilities will:

- Explore applicability of Renewable Energy Certificates (RECs) for true-up of RPS targets. RECs are a form of emission offset that is directly applicable to electricity that may be implemented more cost-effectively than long-term energy contracts
- Develop criteria for allowances and offsets for achieving climate neutrality
- Facilitate alternatives for Utilities customers to meet their climate neutral goals, such as offset alternatives similar to PG&E's "ClimateSmart" program, whereby carbon reduction projects are supported through voluntary contributions
- Monitor and comply with emission allowance regulations being developed under AB32
- Participate in regional offset efforts such as Joint Venture Silicon Valley's Climate Protection Task Force Carbon Offsets Subcommittee's endeavor to develop a local offset market

8. Support Research and Development in GHG-Reducing Science and Sociology

Utilities will conduct and promote research and development, demonstration, and education projects to enhance knowledge related to climate protection and improve information available to customers. Utilities will also:

- Actively share the information gleaned from R&D with neighboring communities and the public at large
- Provide GHG emissions estimates associated with energy use to customers by facilitating access to an on-line emission calculator, and/or developing capability to include GHG emissions estimates with utility bills
- Develop benchmarking metrics, such as home energy comparison reports
- Update electric, natural gas, and water resource plans to highlight Climate Protection efforts

9. Coordinate Energy Climate Activities with Building and Urban Planning Activities

This coordination is discussed in Chapter 6: Green Building and in Action 1 of this chapter (Reduce electricity and natural gas use through conservation and energy efficiency).

Cost-Benefit Analysis

Table 3.2 summarizes the estimated community-wide 2005 CO_2 emissions from electricity and natural gas use, and projected 2020 emissions with impact of each major utility program area for which quantitative estimates have been completed, including efficiency, solar, mandatory

renewable supply, voluntary renewable supply, and low-carbon fossil-fuel supply. The potential impacts of retail rates, offsets, research and development, non-CO_2 gases, and purchasing practices have not yet been estimated.

Table 3.2. Estimated community-wide emissions and emissions reduction impacts of utility program goals

	Electric Metric Tons CO_2 Per Year	Natural Gas Metric Tons CO_2 Per Year
Reference Year 2005	**145,000**	**165,000**
Base Case 2020 (load growth with no efficiency reduction)	178,600	174,000
Efficiency	-15,800	-7,300
Solar	-3,800	-1,500
Mandatory Renewable Energy Supply	-91,500	TBD
Voluntary Renewable Energy Supply	-36,500	-16,400
Total In-Community Reduction	-147,600	-33,400
Net In-City Emissions	31,000 (21% of 2005)	148,800 (90% of 2005)
Low-Carbon Supply (net savings realized by state)	-20,000	n/a
Net Emissions	**11,000 (8% of 2005)**	**148,800 (90% of 2005)**

The ranges for costs per metric ton of CO_2 or CO_2e reduction for each major category listed in Table 3.2 are summarized below in Table 3.3. These estimates reflect net costs incorporating savings from avoided energy purchases, and include combined costs and savings for both customers and the utility. Tax consequences are not included, such as tax credits or deductions for solar energy or energy efficiency investments. The cost effectiveness estimates represented below will continue to be refined as the Climate Protection Plan continues to evolve.

Table 3.3. Estimated cost-effectiveness ranges for community-wide emissions reduction efforts. Cost (savings) in $ per metric ton CO_2 equivalent reduced

Program Area	Electric $ per Metric Ton CO_2 Reduced	Natural Gas $ per Metric Ton CO_2 Reduced
Efficiency	(40)-0	(40)-0
Solar	200-300	(20)-20
Mandatory Renewable Energy Supply	30-40	5-40
Voluntary Renewable Energy Supply	30-40	5-40
Low-Carbon Supply	(15)-0	n/a
Offsets	5-50	5-50
Retail Rates	TBD	TBD
Research & Education	TBD	TBD
Non-CO_2 Gases	TBD	TBD
Purchasing Practices	≤20	≤20

Sample cost-benefit calculations to date include:

- **Energy efficiency programs.** Cost-effectiveness evaluation of energy efficiency programs were described in detail in the Ten Year Energy Efficiency Portfolio Plan (CMR:216:07). That plan aims to lower average bills in the long run, with a payback in six to ten years, resulting in a net savings realized in conjunction with the CO_2 emission reductions. Net savings are projected to be approximately 2 ¢/kWh saved, reducing greenhouse gas emissions by 1.1 lb/kWh, which results in savings of $40 per metric ton of CO_2 reduced. If no net financial savings are realized, the estimated net cost per ton reduced is zero.

- **Meet or exceed Renewable Portfolio Standard (RPS) targets** (at least 33% by 2015 with less than a $0.5 ¢/kWh rate impact). The 0.5 ¢/kWh rate impact limit amounts to an additional $5 million per year. Eligible renewable energy comprised eight percent of purchases in 2005. One-third of annual electricity supply at zero emissions compared to conventional electricity translates to 120,500 metric tons saved compared to the 2004 starting point of 0%, which translates to $40/metric ton saved. The increase from 8% to 33% translates to 91,000 metric tons CO_2 saved per year. The original targets were determined based on Utilities customer preferences and not only on GHG reductions, and staff is working to meet the targets at far less than the allowed rate impact limit.

- **Evaluate the feasibility and cost effectiveness of portfolio targets for non-fossil alternatives to natural gas** (e.g. cowgas). Achieving five percent of gas supply with zero GHG emissions would amount to a reduction of 8,200 metric tons of CO_2; ten percent amounts to 16,400 metric tons reduction. Methane capture from animal manure, for example, could potentially reduce state-wide emissions of methane with a

CO_2 equivalent savings 6.6 times greater due to the high global warming potential of methane. Cow gas currently is available at a price premium of approximately 20 cents per therm, which would be a roughly 20% rate increase to convert 100% of natural gas to biogas. The added cost translates to roughly $37/metric ton CO_2 reduced from not burning natural gas.

- **PV Partners** The current ten-year program plan is sufficient to provide incentives for up to 6,544 kW of photovoltaics, which would generate approximately 10,500,000 kWh per year, or about 1% of annual sales, reducing GHG emissions by 3,800 metric tons. City funding for incentives is $13 million. Currently, photovoltaic systems cost approximately $8,000/kW installed, generating approximately 1500 kWh per year, with associated reductions between .55 and .8 metric tons of CO_2 per year. Assuming a high estimate of 15 cents per kWh for energy savings over twenty years, net cost per ton would be $220 to $320.

- **Develop and implement solar hot water and space heating incentive program,** consistent with recently-enacted AB1470 and the California Solar Initiative solar water heating pilot program. This program might include incentives, education, bulk buys and low-interest financing. Residential solar hot water systems typically cost $3,000 to $6,000, offsetting approximately one metric ton per year in CO_2 and avoiding approximately $180-220 per year in natural gas costs. Assuming a 15 year life, this translates to a cost per metric ton of -$20 to $20.

- **Develop and implement solar pool & spa heating program**. Target 100 pools (there are about 4,000 in Palo Alto). One hundred pools at an average of 500 ft of collector area saving 3.7 therms per square foot per year translates to 185,000 therms per year reduction in natural gas use, reducing GHG emissions by 980 metric tons per year. Cost effectiveness is very site specific, but assuming that only systems with a reasonable economic payback are installed, pool heating measures are expected to result in cost per ton reduced near zero or negative.

- **Implement PLUG-In incentive program**. The PLUG-In program maximum capacity of 20 MW would meet approximately 15% of Palo Alto's annual energy needs, which would result in an estimated local *increase* in CO_2 of approximately 48,000 metric tons per year, but *decrease* state-wide emissions by about 68,000 metric tons per year compared to a combined-cycle power plant. Therefore the net result would be a *decrease* of 20,000 metric tons per year. The program is designed to pay for itself through shared (community and Utilities) savings in 5 to 8 years, with projected CO_2 reduction costing $15 per metric ton.

Monitoring

Utilities will monitor its progress in reducing GHG emissions by:

- Conducting and publishing annual municipal and community-wide emissions inventory estimates from electricity and natural gas use;
- Continuing to certify electric utility emissions with CCAR or equivalent;

- Conduct an engineering study of non-fossil-fuel GHG emissions from Palo Alto Landfill, waste stream, and RWQCP;
- Developing methodology and tools for tracking and for regulatory compliance; and
- Continue developing methodologies for conducting municipal inventories of non-CO_2 emissions.

Table 3.3. Summary of CPP and GRTF Recommendations

GRTF Recommendation	CPP Recommend-ations	Timing	Annual Estimated CO_2 Savings Potential (metric tons)	CO_2 Savings Costs per Metric Ton of CO_2 per year
Reduce electricity and natural gas use through conservation and energy efficiency	Follows GRTF recommendation	TBD	23,100	($40) - 0
Reduce carbon intensity of energy supply provided by Utilities	Follows GRTF recommendation	TBD	20,000	($15) - 0
Expand use of renewable energy installed or purchased directly by customers	Follows GRTF recommendation	TBD	91,500	$5 - $40
Participate in and promote greenhouse gas emissions inventory tracking and reporting	Follows GRTF recommendation	TBD	TBD	TBD
Promote and implement climate-neutral alternatives and education	Follows GRTF recommendation	TBD	TBD	TBD
Employ urban forest opportunities to reduce energy use and increase carbon sequestration	Follows GRTF recommendation	TBD	TBD	TBD
Invest in GHG-reducing projects or offsets to balance remaining emissions	Follows GRTF recommendation	TBD	n/a	$5 - $50
Support research and development in GHG-reducing science and sociology	Follows GRTF recommendation	TBD	TBD	TBD
Coordinate energy-related climate activities with building and urban planning activities	Follows GRTF recommendation	TBD	TBD	TBD

Chapter 4: Sustainable Purchasing

Overview

The City allocates $16.5 million on materials and supplies from its General, Enterprise, and Capital Improvement Project Funds.[3] Almost all of these products and some services acquired by the City will have emissions impact during their use, manufacture or disposal. Incorporating environmental performance criteria into these expenditures could have a measurable impact on climate protection, as well as on other sustainability policies and programs such as Zero Waste, green building, and pollution prevention. Beyond City operations, the City's purchase of environmentally preferable products and services, in conjunction with the environmental purchasing efforts of other Bay Area or State Public Agencies, offers the potential to stimulate market demand and further expand access to these products and services.

Many purchases that are environmentally preferable are also fiscally preferable. Other public agencies report cost savings from purchases that benefit the environment. For example[4],

- King County Washington purchased $30.5 million worth of environmentally preferable products and reported a savings of $675,000 compared to the cost of conventional products. Product examples include recycled toner cartridges, recycled motor oil and antifreeze, and retread tires.[5]
- Columbia University saved $105,000 in one year by defaulting to duplex printing in its computer center. Vendors were required to ship with double-sided copying preset as the default and to train employees to use duplexing equipment to ensure efficient paper use.[6]

Nevertheless, not all products will offer immediate cost savings, therefore a comprehensive approach to analyzing the benefits and costs of sustainable purchases is necessary and is discussed below.

Components of a Sustainable Purchasing Policy and Plan

A Sustainable Purchasing Policy and Plan will include the following:

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[3] 2007-08 Budget allocates the following for materials and supplies: CIP,$8.5 million; General Fund, $4.1 million; Enterprise Funds, $3.9 million.

[4] Realizing similar cost savings in Palo Alto would be contingent on the specific product models required, the volume purchased and the calculations used to evaluate cost benefits.

[5] United States. Department of Executive Services Finance and Business Operations Division. King County Environmental Purchasing Annual Report 2006. King County, Washington, 2006, www.metrokc.gov/procure/green/2006annrep.pdf

[6] INFORM, Waste at Work: Prevention Strategies for the Bottom Line, INFORM and Council on the Environment of New York City, 1999

1. **Prioritizing products and services that balance environmental performance and fiscal criteria**. For example, if a product's manufacture or use is energy-efficient and comparably priced, it would be prioritized for purchase. GHG reduction criteria would be quantified if available.

2. **Exploring operational changes that can offset product costs**. In the example below, 100% recycled-content paper is approximately 9% more expensive than the 30% recycled-content paper the City currently buys, based on current pricing. The additional cost of a higher recycled-content paper could be offset by setting the default on City copiers to print-double sided. This would reduce the amount of paper used and compensate for the additional cost of the product, achieving a net cost savings for the City. It would require an up-front staffing cost to reset the printers and copiers, therefore yielding a negative net cost in year 1, but positive net costs in each year thereafter.

Current cost of paper:	= $64,000
20,000 reams at $3.20	
Cost of new paper:	=$52,500
*20,000 * 75%= 15,000 reams at $3.50/ream*	
Add staff time in year 1 to change default setting on printers and copiers:	=$20,000
Total Cost year 1:	**$72,500**
Less original cost:	- $64,000
Net additional cost, year 1:*	**$8,500.**
Net reduction in cost, years 2 and on:**	**- $11,500**

*Difference between current cost and first year costs including implementation of new paper use
**Net cost=Difference between current cost of paper using 20,000 reams per year, and potential cost of using 100% recycled paper and using 25% less.

3. **Performing a life cycle cost analysis for services and capital products** that may have a longer term pay-back in cost savings. Life cycle analysis assesses the environmental impacts and financial costs of all the inputs and outputs in the life cycle of competing products. It includes the initial product cost, the costs of installation, training, maintenance, anticipated repairs, disposal and/or recycling costs, and potential cost offsets.

4. **Considering purchasing products only when needed and not solely on a replacement schedule.** For example, most of the energy used in the production, use, and disposal of computers is in the manufacture of the components. Therefore, optimizing computer exchange schedules could reduce GHG through the reduced purchase of these products.

5. **Evaluating use of a GHG "adder" in calculating purchasing costs.** Just as Utilities has proposed a $20 per metric ton of C0e in utility purchases as a risk

management cost, the City might include an adder which would quantify the costs involved in remedying the environmental impacts of a less sustainable product.

Current Emission Estimates

As shown in Chapter 2, the City's activities and purchases emit approximately 64,901 metric tons of CO_2e per year, or 8% of Palo Alto's total emissions. An exhaustive list of all City purchases, related emissions and efforts to-date to purchase energy efficient and environmentally preferable products is beyond the scope of this report. This chapter will focus on the need for implementing a system that incorporates environmental criteria into City purchasing. The City's purchase of vehicles, fuels and energy sources, which are large emitters of GHG, are discussed in Chapters 3 and 4 of this report.

The City has already incorporated environmental criteria into some of its purchasing. For example, since 2000, the City has reduced its energy use by 17% by purchasing and installing energy efficient lighting and LED street lighting, and by implementing energy management systems that optimize state-of-the-art HVAC systems. These efforts have resulted in the reduction of 670 tons of CO_2e (607 metric tons). In addition, the City's current purchase of 30% post-consumer recycled content paper compared to virgin paper has reduced CO_2e emissions by 14 metric tons per year. Other purchases include 100% recycled-content bathroom papers, and custodial and printing products with a "less-toxic" designation. These efforts, however, have been driven by specific department projects rather than by a systemic, citywide approach. To institutionalize the consideration of environmental impacts during the purchasing process, staff is drafting a Sustainable Purchasing Policy and Plan. Policy elements are currently being reviewed interdepartmentally and will be brought to Council by June 2008 with the accompanying Plan (see Appendix 3).

Sustainable Purchasing Goals and Actions

Short-Term (2008)

Goals

- Adopt a Sustainable Purchasing Policy
- Identify how City purchases affect emissions
- Engage and educate City staff in Sustainable Purchasing

Actions

- Create an interdepartmental team responsible for completing a Sustainable Purchasing Policy and Implementation Plan by June 2008
    - Include a three-year timeline for incorporating changes to the City's purchasing specifications, scopes of service, and procedures
    - Establish a framework and criteria for identifying, specifying, and evaluating the performance and costs of sustainable products and services

    - Require annual vendor reporting on sustainable product purchases, tracking dollars spent, units purchased, and other information as specified by the City
    - Determine annual reporting needs for the City
- Conduct outreach and education among City employees to promote understanding and participation in Sustainable Purchasing goals
- Present to Council the Sustainable Purchasing Policy and Implementation Plan in June 2008
- Evaluate emissions and other environmental criteria from 2005 City purchases to identify products and services that should be targeted
- Make recommendations for financial resources needed to implement Sustainable Purchasing

Medium-Term (2009-11)

Goals

- Complete implementation of the Sustainable Purchasing Plan

Actions

- Implement programs and procedures that encourage and facilitate both centralized and decentralized purchases of sustainable products and services
- Continue staff education and engagement efforts

Long-Term (2012 and beyond)

Goals

- Evaluate and adjust plan and policy as needed incorporating new technology and environmental priorities.

Actions

- Review Sustainable Purchasing Policy every three years
- Review and revise Sustainable Purchasing Plan and timeline annually and realign with City GHG emission goals and other priorities as needed

Cost Benefit Analysis

This cost benefit analysis targets a few example products for evaluation. The Sustainable Purchasing Implementation Plan will determine which products to focus on first, and cost-benefit analysis will be an integral part of that determination.

Table 4.1. Cost Benefit Analysis

Current Product/ Cost	Proposed product/cost	Reduction in CO_2e metric tons	Cost/metric ton of emission reduction	Notes
Short Term				
New copier toner Cartridges* .1 tons/ Approx $120 per cartridge or $26,760/ year	Remanufactured copier toner cartridges approx $60/cartridge or $15,120per year	.4	($7,875)	Prices vary depending on toner cartridge size and style
Medium Term				
30% recycled-content paper 50 tons $3.20 per ream or $64,000/year	100% recycled content process chlorine-free copy paper /($3.50 per ream $70,000)	32.5	$185	9% Cost difference between 30% and 100% recycled-content paper can be offset by automatic double-sided copies. Prices vary depending on volume purchase. See next action in this table. Reduction in CO_2e includes upstream emissions.
Single-sided printing and copying	Setting default of all copiers and printers to double-sided $20,000 (staff time for printer/copier setting	28.75	$696 (for set-up period only)	Assumes printer and copier replacement as scheduled (no acceleration).
Continue purchasing hybrid cars rather than a high-mileage conventional engine cars	Per car: $20,419 sticker price for hybrid vs $13,027 for high-mileage conventional car	1.37 per car per year	$88/metric ton	Resale value is included in the calculation.

*An average of the cost of various sizes
**This does not factor in the number of remanufactured cartridges that are currently purchased. This number was not available at the time of this report.
***assumes Honda Civic conventional car and Toyota Prius hybrid for purposes of calculations

Table 4.2. Summary of CPP and GRTF Recommendations on Sustainable Purchasing

GRTF Recommendation	CPP Recommendations	Annual Estimated $C0_e$ Savings Potential	$C0_e$ Reduction Costs per Metric Ton
Promote alternative fuels, with the City leading the way in purchasing fuel efficient vehicles.	The purchase of hybrid vehicles does constitute a relatively low cost opportunity to reduce emissions, especially for those staff who take home vehicles long distances. Staff has been concerned about battery and disposal costs which are not included in this analysis; the difference in resale value is included in the calculation.	1.37 metric tons per car	$88
Revise City Purchasing Policies and Practices to Incorporate Environmental Costs	The CPP strongly supports the goal of incorporating environmental costs into purchasing policy.	Mixed	Moderately high

Chapter 5: Transportation and Sustainable Land Use

Overview

The use of fossil fuels in transportation represents one of the greatest challenges in reducing GHG emissions. On a global basis, transportation represents roughly 50% of all emissions of CO_2. Based the analysis carried out in Chapter 2, plus work done by the Green Ribbon Task Force, the community's emissions of fossil fuels from transportation can be summarized as follows:

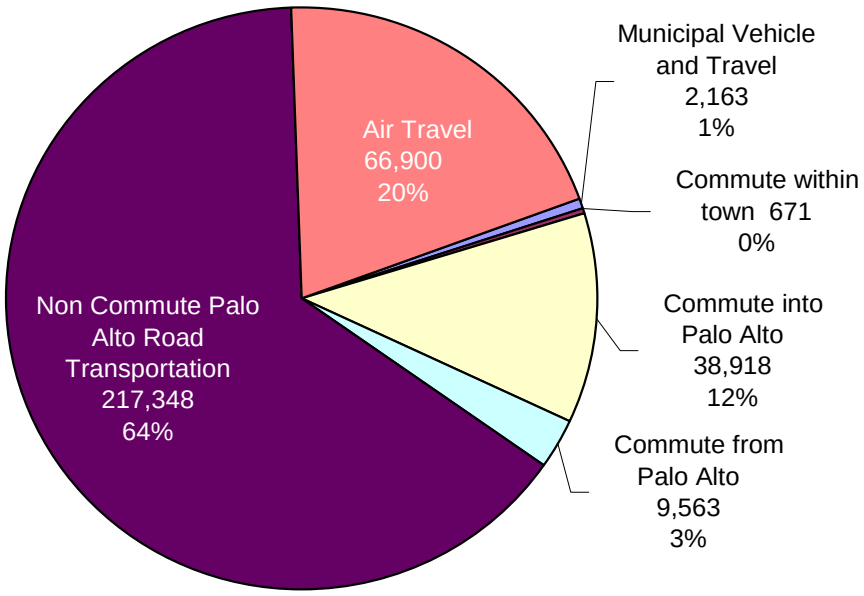
Table 5.1. Summary of Emissions from Transportation, Fuels and City Vehicle Fleet

Emissions Source	CO_2e (metric tons)	Data Source
Municipal Transportation Emissions		
Vehicle Fleet/Fuel Emissions	2,025	CMR211:11
Employee Travel	38	See chapter 2
Municipal Total	**2,063**	
Community Transportation Emissions		
Commute within town	671	GRTF Estimate
Commute into Palo Alto (50%)	38,918	GRTF Estimate
Commute from Palo Alto (50%)	9,563	GRTF Estimate
Non Commute Palo Alto Road Transportation	217,348	GRTF Estimate
Air Travel	66,900	GRTF Estimate
Community Total	**333,400**	
Total Municipal + Community Transportation	**335,463**	

City vehicles, fuel use, and travel represent less than 1% of the total estimated community-wide emissions (Figure 5.1). This illustrates that while the City should continue to most effectively use its fleet and reduce fuel use, the lion's share of reductions must come from the community's current consumption of fossil fuels for transportation. Sustainable management of the City's land is also a key part of reducing transportation-related emissions.

This chapter comprises three parts – one on City government travel-generated emissions, one on community travel-generated emissions, and one on sustainable land use.

Figure 5.1. Summary of Transportation Emissions



Part I: Municipal Travel Emissions - Goals and Actions

City Fleet Background

The current City fleet is aging, and now averages 8 years. The City currently owns just two hybrid vehicles; fleet management staff has been concerned about the long term cost of such purchases as opposed to costs of conventional high mileage vehicles and a concern over battery life and disposal of used batteries. Given the relatively low miles driven by fleet vehicles, staff has focused on 1) purchasing high mileage conventional vehicles with an average of 35 miles per gallon, 2) using CNG as fuel and, 3) implementing fleet optimization techniques. As was shown in Chapter 4, purchasing of hybrids may be less cost-effective than other measures the City could take.

As an alternative to investing in more expensive technology, the City has focused on increasing the utilization of smaller vehicles and reducing the use of larger vehicles and trucks solely to move personnel. Staff is currently looking at ways of optimizing use of the vehicles which will reduce emissions.

Short Term (2008)

Goals:

- Reduce and/or offset City travel-related emissions by 5%
- Create a program to educate and engage staff in reducing travel-related emissions

Actions:

1. Expand Use of Biodiesel in City Fleet

Expanding the use of biodiesel was recommended by the GRTF. The City is currently retrofitting some of its 50 diesel vehicles to reduce emissions as required by state regulations. This retrofit, costing some $17,000 per vehicle, will reduce emissions of NOx (the precursor of ozone or smog) and Particulate Matter (PM10) by up to 85%. While both of these reductions will improve air quality and benefit human health, they will have no effect on carbon emissions.

Currently no technology exists to reduce carbon emissions from diesel, apart from the use of biodiesel. The City does use biodiesel (B20) in heavy equipment operating at the landfill facility. Equipment Management staff purchased some 46,666 gallons in 2005, and would be interested in purchasing more biofuel. However, biodiesel cannot be used with newer vehicles because it cannot be used with the ultra low sulfur diesel they require.

2. Reduce Idling

Idling represents a relatively large component of fleet emissions—perhaps as much as 20% of total fuel use. City trucks often idle for long periods at job sites to power lighting and warning equipment. While the exact number of gallons consumed during idling is not currently known, this information will be determined through analysis of the data from the vehicle optimization system currently being installed.

The City should evaluate the options for equipping each truck with an auxiliary electrical system to power illumination and warning lights without having to run the motor. Such a system would cost approximately $2,000 per vehicle.

3. Purchase Carbon Offsets for Employee Business Travel

Emissions from business travel by City staff members are estimated at 38 metric tons of CO_2 per year. While this amount constitutes a relatively small fraction of the total transportation emissions, it is a source which could be easily offset. The City could alter its travel policy to pay for the purchase of carbon offsets from a recognized set of offset providers to cover all business-related travel, both air travel and ground travel. The City may wish to provide guidelines as to which carbon offset vendors and which types of projects are acceptable.

4. Reinstate Telecommuting Option for City Employees

The City could reduce the impact of employee commuting by allowing employees to telecommute on a limited basis. Clearly, many employees need to be at work in

order to carry out duties and serve the public. While the City policy does allow telecommuting, operating practice within the Departments severely limits the practice. Policies could be adjusted to address managers' concerns with employee telecommuting, for example limiting the practice to two days per month and specifying reporting requirements for work done on days away from the office.

Cost Benefit Analysis – Short Term Actions

1. Expanding use of Biofuel,
B20 costs $4.12 per gallon as compared to $2.80 for regular diesel. A gallon of diesel contains 22.2 lbs of CO_2. This means that the use of B20 reduces emissions by 4.4 lbs for a cost of $1.32. Therefore the cost/benefit of expanding biofuel use is as follows:

Cost: $1.32 per gallon of biodiesel. Benefit = 4.4 lbs of CO_2 emissions averted.

Thus, expanding biofuel under current pricing conditions would reduce emissions by 19 metric Tons (46,666 gals total x 20% = 9,333 gals x 4.4lbs = 41066 lbs total = 18.6 metric tons at cost of 9333 x 1.32=$12,392) cost upwards of $662 per ton of averted CO_2.

2. Reduce Idling
Cost of installation of auxiliary electrical systems: $2,000 per truck.

Annual Savings: If 20% of all diesel is consumed in idling, that translates into a savings of 12,226 gallons of diesel not consumed, or 135.7 m Tons of CO_2 not emitted. At least 20 vehicles could benefit from this retrofit for a total of $40,000.

Therefore, the cost to avoid emitting 1 ton of Carbon would be $295 per metric ton of emissions averted.

3. Purchase Carbon Offsets for Employee Business Travel
The costs of offsets would be approximately 0.77% of total annual transportation portion of travel costs, or approximately $800 plus an estimated $500 per year in administrative costs.. This would result in the offsetting of 39 tons of CO_2 at a cost of $32 per metric ton of CO_2.

4. Reinstate Telecommute Option
The costs of telecommuting include additional costs of managing staff and possibly some loss in productivity (yet gains in productivity in other cases). These costs are very difficult to calculate. Staff members receive an annual benefit which can be used to purchase computers for work at home. Therefore, additional hardware costs would be mitigated. Allowing those staff who can work from home to work 2 days a month through telecommuting could significantly reduce commute emissions. For example, if 20% of City Staff took 2 days a month to telecommute, emissions would decline by approximately 4.4 metric tons of CO_2 per month, or nearly 53 metric tons of CO_2 per year.

Medium Term Actions (2009-2011)

Goals

- Reduce emissions by an additional 5% by 2011

Actions

1. Implement Fleet Optimization Practices

Based on the experience of fleet management consulting firms, this process can save up to 15% of fuel use. This would mean a reduction of about 21,800 gallons of gasoline and about 9,180 gallons of diesel per year. This is equivalent to 284 metric tons of CO_2 per year, at a cost of $15,000 per year.

A fleet optimization system is being installed to allow for better understanding of fleet vehicle and equipment usage, and help optimize utilization. This system will include a vehicle use recording system which will download data at each visit to the City fueling facilities, and at selected data collection sites. This system should allow staff to:

- Monitor factors other than mileage or hours of usage; such as trips per calendar period, or utilization of auxiliary equipment.
- Right-size the fleet – sell off under-utilized vehicles
- Directly charge departments and divisions for use of the all fleet vehicles

2. Implement Fleet Use Accountability

Staff recommends taking additional "fleet use accountability" steps in concert with fleet optimization which would further reduce emissions from vehicle fleet:

- Develop a transportation-on-demand system and place more City vehicles into a single fleet with an on-line reservation system. That system would help employee choose the appropriate vehicle for the task at hand.
- Utilize small zero emissions vehicles for shuttling staff between City Hall, the MSC, RWQCP, and throughout the community.
- Ensure direct billing of all vehicle use to specific jobs.
- Ensure that all municipal vehicles used to drive home are high-miles-per-gallon vehicles.

3. Expand Employee Commute Incentives

Reducing the emissions from City employee commuting poses some difficult challenges. Because of the high cost of living, many employees travel long distances. The average distance per employee commute is 20.5 miles compared to the California average of 18 miles[7]. Total number of employees is 1,073,

[7] TELECOMMUTING AND RESIDENTIAL LOCATION: RELATIONSHIPS WITH COMMUTE DISTANCE TRAVELED FOR STATE OF CALIFORNIA WORKERS. By Gustavo O. Collantes and Patricia L. Mokhtarian Institute of Transportation Studies University of California, Davis Davis, CA 95616 December 2003

making the total number of miles driven during a day 43,993. Total emissions from employee commute total some 22 metric tons of CO_2e per day, or 5,542 m tons per year. Approximately 10% (110 employees) make use of commute incentives that the City offers.

There are two parts to encouraging greater use of public transit and carpooling by City employees: increasing the dollar value of commute incentives, and restructuring the current free parking benefit. The City's commute incentives are significantly less than those provided by neighboring communities. Currently, the City's commute program provides to full-time, permanent employees only $40 per month for train and $60 for van commuting, through tax free voucher. The City also provides $20 for bike and walk commuting and $30 for carpooling. These supplements are not tax free, nor have they been adjusted recently to offset increased transit fares and gasoline prices. The Federal Government allows up to $110 tax-free per month for transit and van commute support. Stanford and Mountain View provide maximum incentives to all employees, including hourly and temporary employees, and their participation rates are considerably higher.

Permanent City employees receive free parking at all City facilities. At City Hall, this benefit is valued at the market rate in Palo Alto of approximately $420 per year. Clearly this benefit promotes the use of vehicular commuting. As long as parking is free, only highly motivated staff, or those conveniently located, will use public transportation or other alternate modes of commuting. To change this situation, the City will need to develop alternative incentives to discourage the use of City parking spaces and encourage greater use of transit and carpooling.

Research shows that offering financial compensation for *not* using City parking is likely to result in significantly reduced emissions from City employee commuting. The Silicon Valley Bicycle Coalition (SVBC) published an analysis[8] of data on 10 different case studies of incentives offered for not using employer parking facilities, covering a total of over 50,000 employees. The data are shown in the Table 5.3 below. In the study, an average incentive of $46 dollars per month decreased parking demand by over 25%. The study also showed that charging for parking fundamentally changed employee's perspectives on driving alone to work and significantly altered commute patterns.

4. Other Actions Needing Evaluation

There are a number of possible actions that have not been considered in this section. These actions are either highly contentious or require the cooperation with other agencies. Additional study is required before a fully cost effective assessment can be made. Those other actions include:

1. Expansion of bike parking at transit centers

[8] Employee Parking Cashout, by Mike R. Bullock. Modern Transit Society. 1997. www.moderntransit.org

2. Provision of showers for staff commuting by bicycle or other human powered commute option
3. Incentives for low emission vehicle and hybrid parking

Cost Benefit Analysis of Medium Term Actions

1. Fleet Optimization
Cost of system is $15,000 per year. Savings are 284 metric tons CO_2e per year. Cost of emissions reductions is $52 per ton of CO_2

2. Fleet Use Accountability
Cost of implementing a system is roughly $1,000 per month in system maintenance. Savings are an additional 5% of fuel usage, based on similar systems in other cities. Therefore the cost/benefit of this system is savings of 95 metric tons of CO_2 per year at a cost of $12,000. Thus, the cost of reduction is approximately $126 per ton of CO_2.

3. Expansion of Employee Commute Incentives
If the City paid the maximum commute incentives, the number of employees commuting would increase to 25%, from 110 to 268. The additional cost outlay would be (268 x $110) – (110 x 40) per month or $300,960 per year. This would offset approximately 1,246 metric tons of CO_2 per year at a cost of approximately $242 per ton of CO_2.

Part II: Community Transportation Emissions – Goals and Actions

Community Transportation Background

As shown in table 5.1, emissions resulting from community transportation amount to 333,400 metric tons per year. The largest share of this – 217,348 metric tons or 65% -- results from "non-commute road transportation" within the City limits. The second largest share, 20%, results from air travel by Palo Alto residents. The third largest component, 12%, is commuting to Palo Alto from other communities.

The goals of the City's and community's actions should be:

- Reduce community travel-based emissions by 5% in the first year, with a goal of a 15% reduction by 2020
- Offsetting remaining travel-based emissions.

All of the following actions would move the community towards those goals, and should be begun immediately, and continued over the medium and long term. This is because effective community transportation emissions reduction programs influence the choices we make by (a) providing an array of acceptable alternatives, and (b) impressing upon the community the direct impact on climate change of their choice of transportation mode.

Short-, Medium-, and Long-Term Actions

1. Offer Additional Shuttles

The City currently operates two shuttle routes and has a cooperative arrangement with Stanford's Marguerite shuttle for noontime service between the downtown and the Quad. Offering additional shuttles would be a handy way to offer people an alternative to getting in their cars.

One option would be to add an additional shuttle bus to the current cross-town shuttle line, extending the line to the Palo Alto Medical Foundation and/or Stanford Shopping Center or other activity centers while maintaining 30 minute headways. A second option would be to offer an additional full-day cross-town shuttle route.

2. Increase the Transportation Demand Management (TDM) Coordinator from .5 FTE to 1.0 FTE.

Currently the half-time TDM coordinator is able to coordinate the Safe Routes to School programs, the Way2Go program, and employee commute incentives program. However, the 20-hour-per-week time allocation is insufficient to aggressively search for new opportunities and to expand efforts to encourage and assist businesses in the community to promote alternative commuting. Increasing this FTE allocation to a full-time position would expand those opportunities

3. Work with School District and parent community to reduce emissions from school commute

Projected enrollment increases in local schools will result in increased congestion and emissions, particularly during the morning commute period, unless the City, PAUSD and PTA volunteers can work together on innovative solutions that encourage a range of alternatives to driving one's children to school solo. Some options include:

- Exploring ways to encourage or incentivize carpooling at the beginning of the school year and as the rainy season begins, especially at schools where vehicle congestion spills over into local streets.
- Incorporating CO_2 reduction into the fall and spring promotion of green school commute choices as well as the efforts of school and district sustainability efforts.
- Expanding the coordination of City and PAUSD efforts to manage congestion on school sites and nearby streets.

4. Purchase Offsets for Community Air Travel

The Transportation Subcommittee of the GRTF estimated that 66,900 metric tons of CO_2 emissions results from air travel by Palo Alto residents. As stated in the employee travel discussion, this is a source which is more difficult to mitigate, but fairly easy to offset. The City is an active participant in developing the Joint Venture Silicon Valley Climate Protection Partners program. The program is being designed to attract donations to support local GHG reduction projects. Specifically, a list of Palo Alto projects would be offered to Palo Alto residents wishing to invest in projects to offset their air travel and

otherwise-generated emissions. Alternatively, the City could work with local non-profits to facilitate the purchase of offsets.

5. Work with VTA, Caltrain and other regional transportation agencies to improve transit services in Palo Alto

The Palo Alto Caltrain station and transit center is the second busiest station on the Caltrain line and is a major transit hub for VTA, Samtrans, AC Transit Dumbarton Express, Stanford Marguerite and Palo Alto and East Palo Alto shuttles. The City should continue to work with these agencies to realize the long term vision for the Palo Alto Intermodal Transit Center, as well as upgrading and restoring a higher level of train service to the California Avenue Caltrain station.

6. Other Actions Needing Evaluation

There are a number of possible actions that have not been considered in this section. These actions are either highly contentious or require the cooperation with other agencies. Additional study is required before a fully cost effective assessment can be made. Those other actions include:

1. Establishment of "Zip-car" or reinstating other car-share service for downtown Palo Alto
2. Incentives for low emission vehicle and hybrid parking
3. Establish bike share program
4. Establish "feebates" – charge for gas-guzzling vehicles/ rebates for fuel-efficient vehicles
5. Invest in public awareness of need to "buy local"
6. Lobby Caltrain for more frequent express train service
7. Lobby for multi-modal pass systems (tickets that work across transit systems)
8. Help establish teleconferencing center for small and home-based businesses, to reduce business travel
9. Lobby for increased carbon tax on fuel and air travel
10. Encourage the PAUSD to adopt their own goals for CO_2 reductions for school commuting
11. Create a biofuels station in Palo Alto

Cost Benefit Analysis – Short- Medium- and Long-Term Actions

1. Offer Additional Shuttles

For an additional bus on the current cross-town line:
Estimated ridership: 100-150 riders a day (equiv. of 100-150 fewer trips per day).
Estimated cost: $125,000 assuming one additional shuttle is same size as existing shuttles.

Cost Benefit: 125 riders x 10 mile trips = 1,250 city miles not driven which is approximately 0.5 metric tons of CO_2e per day x 360 days a year = 180 metric tons of CO_2 per year. Reduction is **$694 per metric ton of CO_2**, not including the effect on congestion.

For an additional all-day cross-town bus, different route:
Estimated ridership: 200-250 riders per day. Estimated cost: $125,000
225 riders x 10 mile trips = 2,250 miles not driven, 324 metric tons of CO_2 averted, at a cost of **$386 per metric ton.**

2. Increase the Transportation Demand Management (TDM) Coordinator from .5 FTE to 1.0 FTE.
Estimated cost: $42,000 plus benefits
Estimated impact: TBD

3. Work with School District on school commute
This could possibly be wrapped into TDM coordinator's job description.

4. Assist in the Purchase Offsets for Community Air Travel
The costs of establishing a "local" offsets program is relatively low. Primary costs include establishing a website for such purchases (or linking up with other cities which have created offset web sites, as well as Joint Venture Silicon Valley's local offset project under development), and administrative costs for reviewing proposed offset projects, validating the offsets are implemented, and ensuring budgetary compliance. The Berkeley system is a "for profit" organization, in that costs are covered by a small fee (5 – 10%) associated with purchases of offsets. This would cost the City nothing, and would not reduce any CO_2 emissions. If 25% of travelers participated, potentially **16,725 metric tons** of emissions could be offset or invested in other emission-reducing projects.

5. Work with VTA, Caltrain and other regional transportation agencies to improve transit services in Palo Alto
Costs for this work would be initially administrative, and could be covered by the additional 0.5 FTE staff addition to the Transportation Division within the City (see below).

Part III: Sustainable Land Use – Goals and Actions

Sustainable land use involves the planning for and development of mixed-use transit friendly live/work neighborhoods. While there is some overlap between land use and green building efforts, land use goals and actions are separately included in this chapter.

Short Term (2008)

Goals

- Develop land use patterns that reduce travel-related emissions by supporting pedestrian, bicycle and transit use
- Reduce and/or offset community travel-related emissions by 5%
- Coordinate with Green Building efforts to ensure compatibility between built environment and sustainable land use initiatives

Actions

1. Facilitate and enhance potential for mixed use development

Mixed use development reduces vehicle miles traveled by allowing residents and workers to live or work near services, such as restaurants, grocery stores, drug stores, retail shops, hair styling salons, etc., facilitating walking or bicycling to and from these services or uses rather than driving. Occasionally, such a mix of uses also allows residents to live close enough to work to avoid the need for commuting by automobile. The City's recent (January 2007) Zoning Ordinance amendments facilitate the use of mixed use on commercially-zoned parcels and allow for small retail services in residential projects. Immediate follow-up actions will include monitoring and evaluation of the effectiveness of the ordinance, so that project proponents are able to develop under the new regulations rather than by the more cumbersome Planned Community review process.

2. Zone for Mixed Use and Higher Density Around Transit Stations

Mixed use and higher density residential uses near transit service are another land use approach to encourage residents and workers to use non-vehicular means of transportation (walking, bicycling, transit), particularly in lieu of commuting by single-occupant vehicles. The City recently (September 2006) adopted a Pedestrian and Transit Oriented Development zone district in proximity to the California Avenue Caltrain station. The district allows higher density residential and mixed use on sites now zoned for industrial uses, as well as on sites primarily zoned and developed for commercial, where some residential use may also be accommodated. Immediate follow-up actions will include monitoring and evaluation of transit use, parking and Transportation Demand Management (TDM) approaches in such projects.

3. Reduce Parking Needs for New Development

Mixed use and transit oriented development, if effective, would reduce the need for parking, resulting in greater utilization of properties for development and increased potential for open space. Recent (October 2007) Zoning Ordinance revisions provide for reduced parking for mixed use development, proximity to transit, and where effective TDM measures are proposed. Immediate follow-up actions will include monitoring the effectiveness of these provisions on reducing parking needs and impacts.

4. Require Transportation Demand Management (TDM) Programs

TDM programs are sometimes proposed or required for development projects to reduce vehicle-miles traveled for commuting or for access to local services. TDM programs may include, but are not limited to, such measures as providing for transit passes, enhanced shuttle service, car-sharing, providing parking preferences for vanpools and "green" vehicles, additional bicycle parking, showers or other on-site amenities. Recent (October 2007) Zoning Ordinance amendments require TDM programs whenever parking reductions are requested or where required as environmental mitigation. The programs must specify

performance objectives, and applicants must provide monitoring information at 2 years and 5 years after project occupancy. Immediate follow-up will include the development of staffing and procedures to implement and monitor these TDM requirements.

5. Develop Monitoring Programs for Transit Use and TDM Effectiveness

The City does not have a program or dedicated staff to monitor transit use and the implementation and effectiveness of TDM programs. As these efforts are critical to reducing vehicle-miles traveled for development in the City, a specific program for these purposes is proposed. The program would include documentation of baseline transit data at transit stations and traffic data for particular developments, and would then annually update such data and incorporate information from TDM monitoring reports, in order to identify the most effective measures for implementation in future projects. A management intern is anticipated to provide an initial outline and data for such a program, and the ongoing effort would be directed by the TDM coordinator (proposed to be increased from 0.5 FTE to 1.0 FTE elsewhere in this report).

Medium Term (2009-2011)

Goals

- Reduce emissions by an additional 10% by 2015
- Increase Caltrain and other transit use by 25% by 2015
- Provide annual reporting of transit and TDM effectiveness

Actions

1. Implement Pedestrian and Transit Oriented Zoning in Downtown

The City has adopted a Pedestrian and Transit Oriented Development zoning district in the vicinity of the California Avenue Caltrain Station. A similar overlay district should be created for downtown Palo Alto in the vicinity of the University Avenue Caltrain Station. The intent of the district would be to encourage higher density residential and mixed use projects within walking distance of the train station and of local services, further reducing automobile trips in and out of downtown. A special effort should be directed at accommodating development in the area of the City's proposed Intermodal Transit Center.

2. Develop Comprehensive Plan Programs to Support Increased Density near Transit

The City's Comprehensive Plan includes a number of policies and programs in support of increased density, particularly in areas near transit stations or along major bus routes (El Camino Real) to facilitate the use of transit and other non-vehicular transportation modes. One of the obstacles to increased residential density, however, is a lack of community facilities, such as schools and parks. The City's Comprehensive Plan Amendment will be addressing these deficiencies, which is critical to effectively implementing strategies for increased

housing. Area plans will be developed for the East Meadow/West Bayshore area and the Cal-Ventura/Fry's area to assess these uses and issues in a focused manner. The City may also implement a Planned Development Area (PDA) project funded by ABAG to evaluate pedestrian and transit-friendly development in the Cal-Ventura area.

3. Modify Zoning Ordinance to Require Pricing Strategies to Reduce Parking

Recently adopted (October 2007) Zoning Ordinance regulations for parking provide reductions for mixed use development, proximity to transit, and TDM measures, as well as for affordable housing and senior housing projects. Reductions in parking should reflect trip reductions and thus reduction of carbon emissions, and should minimize land coverage with parking spaces. Other strategies available to reduce parking include pricing strategies that require developers to "unbundle" parking from rent or lease prices, or otherwise charge for parking. Parking may then become a commodity that a resident or employee can forego by using non-vehicular modes of transportation. The Zoning Ordinance should be amended to provide incentives or requirements for these approaches, which may work as well for the City and parking for its employees and for public parking spaces on streets and in parking lots and garages. Evaluation of residential permit parking may also be required to ameliorate the potential impacts of spillover parking into residential neighborhoods.

4. Develop Plans for Transportation Improvements around California Avenue Caltrain Station

In support of the Pedestrian and Transit Oriented Development zone around the California Avenue Caltrain Station, key transportation improvements will be implemented to enhance pedestrian, bicycle, and transit use in the area. These improvements include: a) streetscape enhancements and lane reductions on California Avenue; b) development of Park Boulevard as a City bicycle boulevard; and c) safety improvements (e.g., dedicated left turn lane from Park Boulevard to Oregon Expressway east, crosswalk enhancements). Additional traffic calming measures may also be evaluated to assure traffic is not diverted through the Ventura neighborhood. Caltrain is also expected to upgrade the train station with improved pedestrian access.

Long Term (2012-2020)

Goals

- Reduce emissions by an additional 10% by 2020
- Increase Caltrain and other transit use by an additional 50% by 2020

Actions

1. Evaluate Pedestrian and Transit Oriented Development Zoning Intensity, Including Along El Camino Real

Pedestrian and Transit Oriented Development zoning and the City's most intense multi-family zoning allow maximum residential development intensities of 40 units per acre. Following completion of the upcoming Comprehensive Plan Amendment, it will be appropriate to evaluate whether higher densities may be accommodated to further enhance pedestrian and transit use. The application of such densities and mixed use standards along El Camino Real may also be appropriate, particularly as the Grand Boulevard concept is implemented.

2. Develop Intermodal Transit Center and High-Density Public Transportation on Demand Project

Development of a high density, mixed use project should be promoted for the Palo Alto Intermodal Transit Center site, in conjunction with improvements to the Transit Center. The project may be a partnership between the City, Stanford, VTA, and private developers, and should stress connectivity to and from downtown, Stanford, the Medical Center, and the Shopping Center.

3. Implement Grand Boulevard Improvement Strategies for El Camino Real

Santa Clara and San Mateo Counties and several cities along El Camino Real, in conjunction with CalTrans, are developing strategies for creation of a Grand Boulevard for the roadway, including safety and streetscape enhancements and guidelines for design of quality mixed use development. The plan objective is to create a more pedestrian, bicyclist, and transit-friendly corridor to reduce the impacts of the automobile. The City of Palo Alto will be implementing one of these projects (at Stanford Avenue) in the mid-term, and others should subsequently be developed for implementation.

Monitoring

The City will measure its progress on reducing transportation-related emissions by tracking:

- Number of gallons of fuel purchased by City per year
- Mix of biofuel v. regular diesel purchased per year
- Estimated rate of idling
- Number participants in City commute program
- Number of low-mileage City vehicles in fleet (as percentage of total)
- Annual communitywide increase in ridership on Caltrain and other transit services
- Estimated annual vehicle miles traveled (community-wide)
- Average miles per gallon for City fleet

Table 5.2. Summary of CPP and GRTF Recommendations

GRTF Recommendation	CPP Recommendations	Timing	Annual Estimated CO_2 Savings Potential	CO_2 Savings Costs per Metric Ton of CO_2 per year.
Promote alternative fuels, with the City leading the way in purchasing fuel efficient vehicles.	Purchase of hybrid cars instead of high mileage conventional cars.	Short Term	1.37 per car	$88
	1. Use of Biofuels	Short Term	19 metric tons	$662
	2. Limiting Idling	Short Term	136 metric tons	$295
	3. Fleet Management	Short Term	284 metric tons	$ 52
	4. Fleet Accountability Programs	Medium Term	95 metric tons	$126
	5. Use of low-emission vehicles for City staff's local use	Medium Term	2.3 metric tons per vehicle	$510
Facilitate increased biking and walking.				
Increase mass transit availability.	Increase Cross town shuttles	Medium Term 180 metric tons	$694	
	Work with VTA, Caltrain and other regional transportation agencies to improve transit services in Palo Alto	Short Term and Medium Term	Unknown	Unkown
Encourage electronic alternatives to travel.	City should allow for telecommuting 2 days a month		53 metric tons	$0
Reduce emissions from school commuting.	School commute likely presents one of the best opportunities for the City to reduce emissions in an arena over which it can exert influence.		Unknown – unknown- fairly high	Unknown – likely fairly low

Table 5.2. (continued)
Summary of CPP and GRTF Recommendations

GRTF Recommendation	CPP Recommendations	Timing	Annual Estimated CO_2 Savings Potential	CO_2 Savings Costs per Metric Ton of CO_2 per year.
City offset its emissions, and encourage businesses and residents to do the same.	City should change travel policy to allow covering costs for emissions offset.		39 Tons	$32
(No GRTF Land Use-related recommendations)			No cost-benefit analysis done for CPP Land Use recommendations	

Table 5.3. Study of Parking Incentives

Study Location	Scope of Study	Assumed No. of Employees	Financial Incentive per mo. (1995 $'s)	Decrease in Parking Demand
Group A: Areas with little or no public transportation				
Century City District, West Los Angleles	3500 employees surveyed at 100+ firms	3,500	81	0.15
Cornell University Ithaca, NY	9000 faculty & staff	9,000	34	0.26
San Fernando Valley, Los Angles	1 large employer (850 employees)	850	37	0.3
Bellevue, WA	1 medium-sized firm (430 employees)	430	54	0.39
Weighted Average of Group		13,780	46.75	0.24
Group B: Areas with fair public transportation				
Los Angeles Civic Center	10000+ employees at several organizations	10,000	125	0.36
Mid-Wilshire Blvd., Los Angleles	1 mid-size firm	430	89	0.38
Washington DC Suburbs	5500 employees at 3 worksites	5,500	68	0.26
Downtown Los Angeles	5000 employees surveyed at 118 firms	5,000	126	0.25
Weighted Average of Group		20,930	109.52	0.31
Group C: Areas with good public transportation				
University of Washington, Seattle Wa.	50,000 faculty, staff & students	50,000	18	0.24
Downtown Ottowa, Canada	3500+ government staff	3,500	72	0.18
Weighted Average of Group		53,500	21.53	0.24
Weighted Average Over 3 Groups		**88,210**	**46.35**	**0.26**

Chapter 6: Green Building

Overview

According to the U.S. Department of Energy, buildings account for approximately 39% of total energy use, over 12% of the total water consumption, 68% of total electricity consumption, and therefore 38% of all carbon dioxide emissions annually in the United States.

These environmental costs can be significantly reduced through the use of green building practices. Green construction methods can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction. However, the most significant benefits can be obtained if the design and construction team takes an integrated approach from the earliest stages of a building project. Potential benefits of green building include:

- **Environmental benefits,** such as enhancing and protecting biodiversity and ecosystems, improved air and water quality, reducing waste streams and conserving and restoring natural resources.

- **Economic benefits** including reduced operating costs, expanding and shaping markets for green products and services, improving occupant productivity, and optimizing life-cycle economic performance; and

- **Social benefits** including enhanced occupant comfort and health, heightened aesthetic qualities, minimized strain on local infrastructure, and improved overall quality of life.

The green building checklists commonly used in California are the Leadership in Environmental and Energy Design (LEED) and the Green Point Rated (GPR) checklists. The LEED checklist is advocated by the U.S. Green Building Council and is commonly used for nonresidential projects, and the GPR checklist is advocated by the nonprofit organization "Build It Green" and is commonly used for residential projects. The City's current Green Building Policy requires LEED certification for all new City buildings over 10,000 feet.

City staff, along with the Architectural Review Board, has been requesting green building checklists for the past four years to encourage applicants to incorporate green building materials and practices into their projects. On October 11, 2007, an ordinance went into effect citing Council adopted sustainability policy as a consideration for reviewing

certain planning applications, and thereby allowing City staff to require the submittal of a LEED, GPR or an equivalent checklist to complete an entitlement application. A minimum number of LEED or GPR points is suggested, but compliance is voluntary. Also in effect as of October 11, 2007, a revised Architectural Review Approval Finding (#15) requires the following for projects subject to Architectural Review:

> The project (must) exhibit green building and sustainable design that is energy efficient, water conserving, durable and nontoxic, with high-quality spaces and high recycled content materials. The following considerations should be utilized in determining sustainable site and building design:
>
> - Optimize building orientation for heat gain, shading, daylighting, and natural ventilation;
> - Design of landscaping to create comfortable micro-climates and reduce heat island effects;
> - Design for easy pedestrian, bicycle and transit access;
> - Maximize on-site stormwater management through landscaping and permeable paving;
> - Use sustainable building materials;
> - Design lighting, plumbing and equipment for efficient energy and water use;
> - Create healthy indoor environments; and
> - Use creativity and innovation to build more sustainable environments.

Single family residences are not subject to Architectural Review Approval Finding #15 unless there are three or more homes proposed by the same applicant. Residential projects subject to discretionary planning review in addition to building permit review are requested to submit a Green Point Rated checklist, which is included in Build It Green's Guidelines for New Home Construction and Remodeling. All applicants for single family residential projects are directed to the City's website or the Development Center's Green Building kiosk to obtain their own copy of the guidelines.

Also in October, the City launched the "Ask an Expert" service, a phone and email service that provides free assistance to building professionals and the public in an effort to make Palo Alto homes healthier and higher-performing. This service, also provided by Build It Green, is made possible by the City of Palo Alto Public Works, Utilities, and Planning and Community Environment Departments.

The consensus emerging within the City is that incentive programs will likely increase the level of green building and are an important first step before implementing mandatory requirements. The City's website now includes a green building incentives matrix (http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=9453) to help Palo Alto homeowners take advantage of incentives available to enable new homes or remodels to be higher performing (a.k.a. "green"). This matrix of rebates, tax credits, and services is organized into categories corresponding to the Build It Green Guidelines, which are (1) Site & landscape, (2) Building Envelope, (3) HVAC & Plumbing, (4)

Appliances & Lighting, (5) Renewable Energy, and (6) Tools & Financing. The City's Green Building Team is exploring additional incentives to promote green building.

Projects going through planning entitlement processes are subject to the existing City requirements for water efficient landscape design and to several existing and recently adopted zoning code requirements and guidelines (PAMC 18.23, 18.40, 18.76 and 18.83) designed to enhance the City's tree canopy and landscaping and mitigate stormwater pollution. The Urban Forest Master Plan will further address the Green Ribbon Task Force Building Committee's recommendation regarding the use of trees to save energy and the requirement for water efficiency.

Chapter 5, Transportation and Sustainable Land Use, addressed the GRTF's Building Committee's recommendations regarding transit-oriented and traffic reducing development and the promotion of biking and walking.

Additionally, the City will consider amendments to the California Energy Code, part of Title 24, or the California Building Standards Code, when the next version is published in March 2008. The anticipated amendments would establish more stringent energy efficiency standards for buildings beyond what the Energy Code currently requires. At this time, a target of 10%-15% additional energy efficiency for buildings beyond Title 24 requirements appears practical and justifiable. However, a study demonstrating the expected energy savings and cost-effectiveness of the proposed standards, as well as findings that the amendments are reasonably necessary based on local climatic, geologic or topographic conditions, will first need to be prepared. The study, proposed amendments and findings will then require approval by the City Council before submission to the California Energy Commission.

Goals and Actions

Short Term (2007/2008)

Goals

- Require LEED "Silver" certification or equivalency for new City buildings over 5,000 square feet, which are to be occupied by people, with limited exceptions (current policy requires LEED certification for new buildings over 10,000 feet)
- Require substantial renovations and additions of over 5,000 square feet to City buildings to be evaluated by an appointed green building professional to determine the costs and benefits of adding or enhancing green building features
- Require City building renovations and additions of under 5,000 square feet to use a LEED or equivalent checklist as a guideline to enhance the green building features
- Increase understanding of green building practices and benefits through stakeholder involvement

- Explore and implement incentives to increase the level of voluntary green building for all residential and commercial projects
- Require multi-family and commercial buildings (new construction and renovation) to have a minimum level of green building compliance starting July 2008
- Establish reasonable, cost-effective energy efficiency and conservation requirements for buildings that exceed California Energy Code (Title 24) standards

Actions

- Following Council discussion on December 3, 2007, update the existing City green building policy
- Create task force or review committee composed of developers, architects and other stakeholders to provide feedback and ideas on approaches to green building incentives and requirements
- Continue benchmarking green building programs of other cities
- Continue to work with Utilities staff on developing and implementing meaningful incentives
- Coordinate with Utilities and Recycling program, and with newly created staff/citizen forum on public outreach efforts
- Draft and circulate an ordinance for mandatory multi-family and commercial green building and introduce the ordinance for passage in spring 2008 (July 2008 effective date)
- Train existing staff (and possibly offer a pay incentive for certification or accreditation) or contract out for expertise in LEED and GPR (e.g. projects not designed by a LEED accredited architect/engineer could pay a fee for review by someone with LEED expertise)
- Adopt California Energy Code (CEC) (by reference). Retain consultant to perform relevant studies to justify local amendments to the CEC that will require increased energy efficiency and conservation measures. Adopt local amendments to the CEC with applicable findings and submit to the California Energy Commission

Medium Term (2009-2011)

Goals

- Require new single-family residential construction to have a minimum level of green building compliance starting July 2009.
- Monitor compliance levels and impact of new policies.
- Provide recognition for "green building."

Actions

- Introduce an ordinance for mandatory low-density residential green building for passage in spring 2009 (effective July 2009.)

- Increase understanding of green building practices and benefits through stakeholder involvement.
- Continue to conduct staff training (and reward certification/accreditation).
- Explore new financing opportunities for green building efforts (e.g. green-friendly banks such as New Resource Bank and Valencia Green Bank.)
- Include "green building" among criteria for determining the 2010 ARB award winners.

Monitoring

The City will monitor its progress in the green building arena by tracking annually:

- Number of Green Point Rated and LEED-certified building projects completed
- Square feet of Green Point Rated and LEED-certified projects completed
- Number of building projects following LEED and BIG guidelines, but not certified
- Average point ratings achieved for City buildings
- Average point ratings achieved for residential projects
- Average point ratings achieved for commercial projects

Table 6.2. Summary of CPP and GRTF Recommendations

GRTF Recommendations	CPP Recommendations	Cost Benefit
(1) Provide green building planning and building review advice and education (2) by hiring new, (3) training existing staff or (4) using consultant time. (5) Require senior building officials to be LEED (Leadership in Energy and Environmental Design) accredited and BIG (Build it Green) certified. (6) Provide green educational materials at planning and building department.	(1) Continue to direct the public and building professionals to the Development Center Green Building kiosk, City website, and applicable City requirements and guidelines. (2) Continue to seek candidates for planning and building positions with keen interest in green building who also meet the other qualifications. (3) Continue to encourage technical staff to take green building courses and become BIG certified and/or LEED accredited and explore providing pay incentive for such achievement and maintenance of certification. (4) Continue to use green building consultants (including BIG's Ask-An-Expert) as needed. Continue to support LEED accreditation as desirable training for ARB members. Two current ARB members are LEED accredited, which helps to review ARB applications for green building features. (5) *Requirement for LEED accredited/BIG certified senior officials is not recommended,* since it can eliminate good candidates and this knowledge is only a very small portion of what such management-level officials need to know. (6) Consider differential pay for employees with BIG certification or LEED accreditation.	(1) No change in cost other than continued outreach; Potential benefits are great. (2) No cost; good potential benefit. (3) Cost could be pay differential (1%?) to encourage certification and accreditation; Benefit could include savings when outside consultants are not needed for city projects (4) Benefit of Ask An Expert could be increased green building for new homes and remodels. No cost for ARB members having LEED accreditation, as the City does not pay ARB members; benefits are great.

Table 6.2. (continued)
Summary of CPP and GRTF Recommendations

GRTF Recommendations	CPP Recommendations	Cost Benefit
(1) Require LEED/GPR checklist points list to be printed on permit drawings, and (2) require an escalating number of points be met over a period of years.	(1) Continue to require checklists with planning entitlement applications submitted after October 11 (effective date of PAMC Chapter 18.77 revision referencing Council adopted sustainability policy). Can include a condition of approval for those applications to include the checklist on building permit plan sets, HOWEVER, neither building plan checkers nor construction inspectors would be responsible for actual compliance with checklist items, would not be "signing off" building's compliance with green building checklists. The points would need to be documented by the architect/contractor/owner in a specific way (for USGBC/BIG); it would not be feasible for City inspectors to track. (2) Begin to draft mandatory green building ordinances for Council review and adoption in 2008 and 2009 that will seek enhanced green building levels over a period of years.	(1) No change in cost; requiring checklists to be printed on plan sets would not require inspectors to "sign off" and does not guarantee green building nor can the City require certification and consultant evaluation at this time. (2) Cost is City staff time needed for research, meetings, ordinance preparation, education and outreach, and eventual enforcement for non-compliance (unknown cost). Benefits not quantified.
Provide incentives or recognition for incorporating green building elements in both residential and nonresidential buildings.	The City's Green Building Team should continue to explore and promote incentives to the public. The ARB's award program (currently five-year interval) should continue to include green building as a factor for determining winners that were subject to ARB review. Green homes tours feature built Palo Alto homes, which provides recognition, but additional recognition programs could be established for single family homes.	Cost is City staff time needed for research, meetings, establishment and maintenance of incentives and recognition programs. Benefits not quantified.

Table 6.2. (continued)
Summary of CPP and GRTF Recommendations

GRTF Recommendations	CPP Recommendations	Cost Benefit
(1) Offer expedited reviews or lower costs for green energy projects. (2) Allow specific exemptions to building guidelines when green elements are applied.	(1) The City's Green Building Team should continue to explore "feebates" and the like for enhanced "green" projects or extending the review period for projects that are not "green". It is not likely that staff could review building permits in less time than current practice, and could lead to mistakes. (2) The City should consider exemptions to zoning ordinance requirements, such as using the Design Enhancement Exception (DEE) process, where there is a nexus to green building (e.g. a parking structure to exceed maximum lot coverage to allow the extended area that would have been surface parking to be landscaped instead.)	(1) City staff time needed for research, meetings, outreach and education. Benefits to customers that choose higher levels of green. Costs to customers that choose not to build green or lower levels of green. (2) City staff time needed only if exemptions are to be codified rather than considered on a project-by-project basis. If codified, would need task groups to study possible code changes prior to recommendation. Benefits not quantified.
Build or establish more traffic reducing development.	City should continue to partner with Eden Housing and Community Housing Alliance to develop affordable housing on Alma near the University Avenue Caltrain station.	Cost is City staff time needed for meetings; project development costs should be partially offset by Housing Impact Fees from other development projects in City. Benefits are likely greatest for affordable and attainable housing to reduce trips.

Table 6.2. (continued)
Summary of CPP and GRTF Recommendations

GRTF Recommendations	CPP Recommendations	Cost Benefit
(1) Provide incentives to encourage businesses and residents to invest in efficiency and renewables; and (2) explore requiring energy upgrades (e.g., installation of solar hot water) when a property changes hands or undergoes significant improvement.	(1) City should continue to provide and promote the public's use of the incentives matrix on the City's website. (2) The City's Green Building Team should continue benchmarking and discussing incentives for energy upgrades and requirements, working with stakeholders leading up to mandatory green building ordinance implementation.	(1) No change in cost; good benefit, (2) Cost is City staff time needed for research, meetings, outreach and education. Benefits not quantified.
Use trees to save energy and encourage or require water efficiency (and aquifer replenishment).	Continue to enforce existing City requirements and guidelines re: water efficient landscaping. (Aquifer replenishment is a different topic).	No change in costs for ongoing compliance.
Encourage transit-oriented development (TOD) and promote biking and walking.	Continue to encourage applicants to build TOD per the applicable Comprehensive Plan Policies and Zoning Code sections (See CPP Chapter 5)	No change in costs for ongoing encouragement.

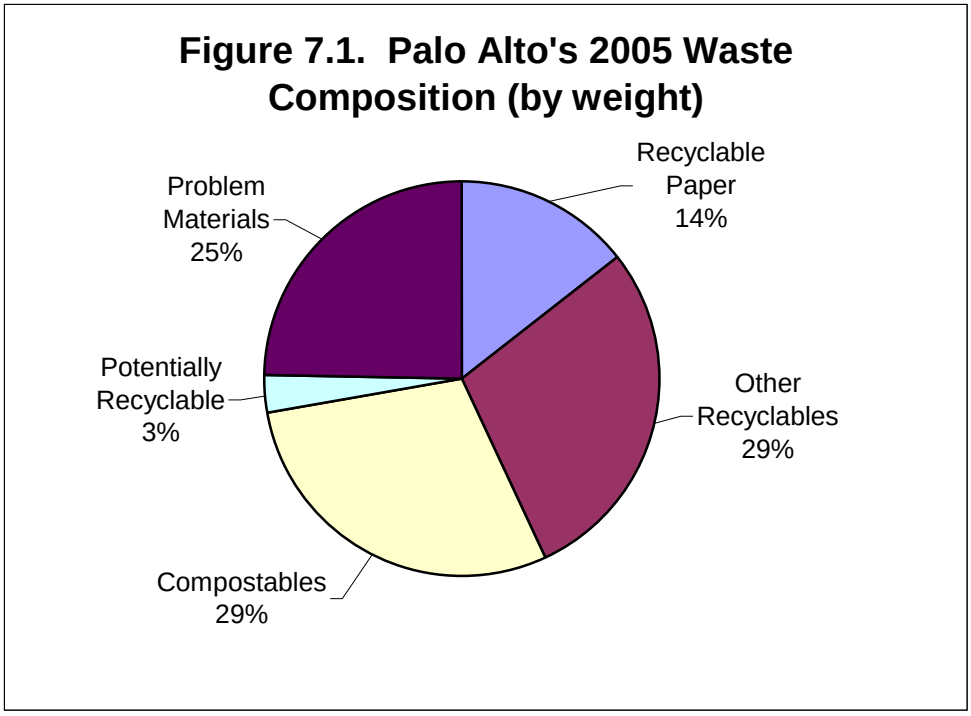
Chapter 7: Zero Waste

Overview

In October 2005, the City established a goal of 73 percent diversion by 2011 and to strive for Zero Waste by 2021. To reach these goals, the City will need to work collaboratively with all waste generators (e.g., residents, businesses, institutions) to use policies and incentives designed to eliminate waste at the source and maximize recycling through expanded collection programs, processing facilities, education, outreach and technical assistance.

The waste reduction and diversion goals of Zero Waste will have a significant impact on greenhouse gas (GHG) emission reductions through the decrease of overall production of materials (resource extraction, manufacturing, transportation and disposal) and through the diversion of materials from landfills.

A waste composition study was done as an initial step toward achieving Zero Waste to understand the current waste stream and identify opportunities for additional waste prevention, reuse, recycling and composting. Figure 7.1 shows the percentages of the components in the waste stream. Study findings indicate that approximately 43% of the waste stream is currently recyclable (recyclable paper 14% and other recyclables 29%). Problem materials are those items that are currently unrecyclable, reusable or compostable. Maximizing our use of the current recycling program is the quickest and least expensive action we can take to make significant strides toward both Zero Waste and GHG emissions reductions. Program maximization will not be easy, however, because Palo Alto has a 35 year history of a comprehensive waste reduction program that has already captured easy gains. Additional efforts must address those sectors of the community that up to now have not been engaged in waste reduction efforts or only minimally engaged. Such new efforts will need to address and overcome their barriers to participation.



The GRTF did not make recommendations on Zero Waste. Instead it deferred to the Zero Waste Operational Plan, which incorporated the recommendations of the Zero Waste Task Force.

Current Emissions Estimate

Palo Alto's total waste-related emissions in 2005 were 100,304 metric tons of CO_2e.

Waste-related emissions data are comprised of two primary components.

- 2005 Historic Emissions - Annual emissions caused by the decomposition of waste disposed in the Palo Alto landfill before 2005
- 2005 Emissions - Lifecycle emissions from materials landfilled in 2005.

Both historic and lifecycle emissions refer only to methane generated but not collected. The collected portion of emissions from the Palo Alto landfill are captured through landfill gas recovery systems and used by the Regional Water Quality Control Plant (RWQCP) to incinerate waste water treatment sludge or otherwise converted to CO_2 by flaring.

2005 Historic Emissions

The historic emissions were estimated 20,643 metric tons of CO_2e in 2005, although this estimate has a high degree of uncertainty. ICLEI estimated the emissions as high as 55,000 metric tons, while CCAR based estimates are approximately 3,900. These emissions are based on an estimate calculated by ICLEI using the LandGEM model from the US EPA.[9]

[9] Landfill Gas Emissions Model software from US EPA which calculates GHG emissions from landfills.

2005 Lifecycle Emissions

The emissions created by the waste generated in 2005 are factored using two calculations, Clean Air and Climate Protection (CACP) Software from ICLEI and US EPA emissions factors.

The lifecycle emissions of methane from materials that were landfilled by Palo Alto in 2005 were estimated using the CACP software from ICLEI. The emission estimates were calculated using waste tonnage data from Palo Alto's 2005 Annual Report to the California Integrated Waste Management Board (CIWMB) and the percentages of material by type in the waste stream derived from the 2006 Waste Composition Study. Palo Alto emitted 24,823 metric tons of CO_2e in 2005 from the material disposed in landfills as shown in table 7.1.

Table 7.1. ICLEI Emission Estimates for Waste Landfilled in Palo Alto in 2005

	Tons of Waste[11]	Metric Tons of CO_2e[12] (as methane)	Notes/Data sources
Total Waste to Landfill	69,491		Disposal tonnage from 2005 annual report
Paper products		12,027	ICLEI CACP protocol
Food Waste		15,237	ICLEI CACP protocol
Plant Debris		-644	ICLEI CACP protocol
Wood/Textiles		-1,797	ICLEI CACP protocol
Total Emissions from Landfilled Waste		**24,823**	

The US EPA emission factors from the 2006 *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (3rd Edition)* report are based on a life-cycle approach, which reflects emissions and avoided emissions upstream and downstream from the point of use. As such, the emission factors provide an account of the net impact to the environment. This life-cycle approach incorporates impacts occurring outside of the community. However, Palo Alto's demand for products directly causes these products to be manufactured, thereby causing the associated emissions. For this reason, these emissions have been included in Palo Alto's inventory.

The US EPA emissions factors were used to estimate Palo Alto's emissions in 2005 due to recyclable materials that were disposed in the landfill instead of being recycled. If these items had been recycled, the following emissions could have been avoided. Additional emissions reductions are achievable than estimated by this table because the US EPA emissions factors do not include material reuse which is less energy intensive than recycling and thus emits less, and there are no emissions factors for a variety of recyclable items (listed as 'no data' in the table). Therefore, the calculations represent the minimum reduction potential for removing reusable and recyclable materials from our waste stream. These calculations, shown in table 7.2, indicate that Palo Alto was

[11] Source: Palo Alto Annual Report to CIWMB (2005)
[12] Source: Palo Alto Waste Composition Study (2006)

responsible for the emission of 54,838 metric tons of CO_2e due to landfilling of recyclable materials.

Table 7.2. Emissions Due to Landfilled Recyclables in Palo Alto in 2005

	Tons in Waste Stream[13]	Emissions Metric tons CO_2 (2,200 lbs)[14]
Paper		
Corrugated cardboard	1,965	6,110
Magazines	1,617	4,963
Newspaper	1,744	4,867
Office Paper	1,432	4,081
Phonebooks	46	123
Mixed Paper	3,151	11,154
Total Paper	**9,955**	**31,299**
Plastics		
HDPE	379	527
PET	293	451
Plastic Bags	306	518
Mixed Plastics	1,564	2,330
Total Plastics	**2,542**	**3,825**
Glass		
Mixed Glass	1,147	321
Total Glass	**1,147**	**321**
Metals		
Aluminum Cans	113	1,537
Steel Cans	341	611
Mixed Metal	2,031	10,662
Total Metals	**2,486**	**12,811**

[13] Sources: Palo Alto Waste Composition Study (2006), Palo Alto Annual Report to CIWMB (2005)
[14] Source: US EPA *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (3rd Edition)*

Table 7.2 (continued)
Emissions Due to Landfilled Recyclables in Palo Alto in 2005

	Tons in Waste Stream[15]	Emissions Metric tons CO_2 (2,200 lbs)[16]
Electronic Waste		
Brown Goods	220	No Data
Computer Related Electronics	95	No Data
Other Small Consumer Electronics	17	No Data
TV's and CRT's	81	No Data
Total Electronic Waste	**412**	**No Data**
Construction and Demolition		
Concrete	1,383	14
Rock, Soil and Fines	5,115	No Data
Gypsum	1,649	No Data
Asphalt Roofing	1,792	No Data
Total C&D	**9,940**	**14**
Other Waste		
Hazardous Wastes	423	No Data
Tires	0	0
Wood	2,670	6,568
Total Other	**3,092**	**6,568**
Grand Total	**29,574**	**54,838**

Zero Waste Goals & Actions

Short Term (2008)

Goals

- Integrate Climate Protection into the Zero Waste program
- Expand implementation of Zero Waste programs

Actions

- Integrate climate protection analysis into the Zero Waste decision-making process
- Expand efforts in waste prevention through legislation, policies, ordinances, outreach and technical assistance

[15] Sources: Palo Alto Waste Composition Study (2006), Palo Alto Annual Report to CIWMB (2005)
[16] Source: US EPA *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks (3rd Edition)*

- Reduce the amount and toxicity of consumer product waste through measures that place the appropriate level of responsibility on manufacturers for the end-of-life of their products
- Encourage innovative reuse and recycling services to be added by the private sector and nonprofit groups, such as electronics and building materials, so the City does not have to invest in those activities
- Work with residents, businesses, community organizations, Bay Area Product Stewardship Council, Bay Area Zero Waste Communities, Bay Friendly Regional Coalition and other such groups to further the City's Zero Waste efforts
- Modify the Construction and Demolition (C&D) debris ordinance to:
    - Increase the amount of materials salvaged for reuse
    - Increase the diversion percentage required for demolition permits from 50% to 75%
    - Increase the number of projects that are covered by the ordinance
- Expand collaborative efforts with targeted businesses to reduce the use of disposable items such as plastic shopping bags and take-out containers
- Facilitate connections between food rescue organizations and Palo Alto businesses to reduce the amount of food discarded into the waste stream
- Support development of a Sustainable Purchasing Policy and Implementation Plan (see Sustainable Purchasing chapter)
- Propose a grant or loan program for local reuse and recycling
- Ensure that new waste collection and processing service RFP includes Zero Waste service options (e.g., expanded organics collection, expanded C&D debris collection and container inspections upon collection)
- Enhance business, multi-family and school waste reduction programs
- Divert remaining debris boxes rich in C&D materials to C&D processing facilities
- Propose a phased-in mandatory recycling ordinance
- Propose materials to be banned from the Palo Alto Landfill
- Retool the SMaRT Station to increase diversion rate from 18% to 25%
- Find a location for a local recycling drop-off center and household hazardous waste facility

Medium Term (2009-2011)

Goals

- Achieve 73% diversion of waste from landfill by 2011, with an estimated GHG emissions reduction of 6,849 metric tons CO_2e.

Actions

- Modify garbage rates to encourage Zero Waste
- Collaborate with the Planning and Community Environment Department to increase Green Building and adaptive reuse efforts (see Green Building chapter)

- Build on collaborative efforts with targeted businesses to reduce disposable items
- Propose Sustainable Gardening and Landscaping Policy and Implementation Plan
- New collection contract
    - Expand the organics program
    - Provide recycling services to all commercial customers
    - Expand the types of recyclable materials collected by the curbside program
    - Improve the current bulky item collection program to further reuse and recycling
    - Divert additional industrial loads to C&D debris processing facilities
- Propose possible product bans or fees to reduce the use of products such as plastic bags and bottled water
- Implement approved material bans and mandatory recycling ordinances
- Improve recycling in public areas

Long Term (2012-2021)

Goals

- Zero Waste by 2021 (78 – 90% diversion of waste from landfill) – estimated GHG emissions reduction of 25,251 metric tons CO_2e.

Actions

- Evaluate emerging technology or other innovative approaches to materials management
- Continue to develop and implement Zero Waste programs

Cost Benefit Analysis

Staff estimates that the above actions will impact City and communitywide emissions as follows:

Table 7.3. Costs and Emission Reductions

Percent of waste diverted from landfill	Cost (additional)[17]	Emission Reduction (metric tons CO_2e)	Cost/Metric Ton of Emissions Avoided
68%	$615,000	9,623	$64
73%	$3,376,000	10,254	$329
78%- 90%	Not available	37,806	Not available

[17] Zero Waste Operational Plan

Monitoring Plan

The City will use the data created for this plan as a baseline and will use this same measurement tool annually to calculate the impact of the City's waste reduction and diversion efforts on greenhouse gas emissions reduction using the disposal tonnage and waste percentages from the 2006 Waste Characterization Study to calculate the estimated emission changes.

This monitoring plan shall be followed until more accurate and/or reliable data become available or state regulation regarding waste reports changes the reporting data.

Chapter 8: Education and Motivation

Overview

Climate Protection is a challenge that requires innovation and collaboration among all of the stakeholders in the Palo Alto community. It will necessitate, in many cases, learning new ways of conducting our daily lives. The Palo Alto City government and community, in cooperation with surrounding communities and regional efforts, will need to work together to examine these issues from multiple angles, build cohesion among the various stakeholders, reach consensus, and move together toward achieving progressive, successful solutions.

The GRTF recommendations presented the concept of "nodes" or segments to educate and motivate the public. To achieve our emission reduction goals, the City must work with representatives of the business, nonprofit/service organization, faith, and school communities, as well as neighborhood organizations, to communicate, coordinate, and implement climate protection efforts throughout the community.

This chapter proposes a strategy based on the GRTF recommendations for both City operations and the larger community. The main focus is the creation of collaborative relationships through which all the stakeholders can freely discuss the problems associated with climate protection, gain a fuller understanding of what is required to reduce the community's carbon footprint, determine what needs to be done to move forward, and then cooperate on implementing the plan.

The actions prescribed in this chapter do not have a cost-per-ton analysis associated with them. Since education and motivation will be the foundation for the success of every other component of the CPP, the costs and benefits are not calculated separately.

Goals & Actions

City Operations

Although City operations account for 10.5% of Palo Alto's total GHG emissions, changing City operations to become more "climate smart" will set an example for the community, provide leadership, test solutions for viability, and help build markets to make products and services more readily available.

This section will address how to engage City employees in making the changes necessary to reduce City-generated emissions.

Short Term (2008)

Goals

- Increase City employee's awareness of climate protection issues and the Climate Protection Plan

Actions

- Create a Climate Protection Education & Motivation (CPEM) task group from the Environmental Stewardship Steering Committee that includes representatives from the affected departments.
- Through the new CPEM task group, create an interdepartmental outreach, education and engagement plan (which may include loop messages, flyers, intranet site, work group meetings, all-City-employee meetings, new City employee trainings, incentive programs and more)
- Identify actions that have the greatest impact on CO_2 emissions (e.g., vehicle idling, single-sided copying or printing out emails)

Medium Term (2009-2011)

Goals

- Target 5-10 core actions and/or processes for reducing emissions
- Integrate climate protection into City events and operations

Actions

- Integrate learning into new employee training
- Work with HR to create new training program for all current employees regarding climate protection and other environmental issues
- Integrate climate consciousness into City functions (e.g., make all City- sponsored events "BYOPS" [bring your own place setting] and otherwise promote Zero Waste, biking/walking/carpooling, energy efficiency, use green power, buy local and organic food products, require vendors to adhere to City sustainability policies)
- Create an incentive program to reward departments or divisions that implement effective reduction efforts
- Create working groups to address the identified actions
- Launch campaigns to encourage desired actions and practices

Long Term (2012 and beyond)

Goals

- Complete integration of climate protection into all City operations

Actions

- Continue education and outreach efforts, monitoring and adjusting them as needed

Communitywide Efforts

To effectively work with the community, the City must have an effective, two-way mechanism for communicating and collaborating with the members of the public.

The communitywide efforts section of this chapter comprises two components: the creation of a collaborative forum between citizens and staff, and the development and implementation of a citywide public information strategy.

I. Citizen/Staff Forum

Create a public private partnership where city staff, citizens, and businesses collaborate on implementing sustainability initiatives through public education and other programs. The forum should be a standing, action-oriented body focused on sustainability, with members from all six community segments articulated by the GRTF, focusing on climate protection for the first two to three years. This forum would coordinate and promote events and groups similar to some that have already taken place in the community, such as Palo Alto Business Goes Green, via the Chamber of Commerce, the Sustainable Schools Committee, the Interfaith Convocation on Climate Change, the Solar Homes Tour, and several other lectures/presentations and events throughout the community. The forum would also explore collaborating with Stanford on outreach events and programs.

Short Term (2008)

Goals

- Launch the Citizen/Staff Forum

Actions

- Create and convene a collaborative citizen/staff forum with representatives from all six segments of the community
- Create first annual Goal-Setting process for the forum
- Forum identifies its top-three priorities for the coming 1-3 year period
- Forum selects top-3 projects or actions for implementation in year 1

At the end of the first year, goals and projects will be re-evaluated and re-prioritized for the following year.

II. City Public Information Strategy

The City will develop and implement a public information strategy to integrate climate protection into ongoing City sustainability outreach and education efforts, as well as share information about other organizations throughout the community working on climate change.

The public education plan will incorporate:

- A more fully developed and accessible/searchable web site on climate change and sustainability issues
- Utility bill inserts regarding new program developments
- Utilization of other City outreach mechanisms (e.g., City Pages, Frank's Memos, Community & Business Recyclers, Utility Announcements, Libraries, Enjoy Catalog and the Family Services Ambassador Development Program)

- Press strategy aiming for systematic outreach and discussion of climate change in the local press. For example, collaborating with one or more local nonprofits to have a weekly "Ask the Environmentalist" column in one of the local papers.
- Internet-based communications – utilizing Facebook, blogs and other vehicles for getting the City's message(s) out.

Short Term (2008)

Goals

- Increase awareness of climate protection issues and new plan

Actions

- Explore the options for creating baseline data of the community's awareness
- Integrate climate protection into City outreach, harnessing the outreach currently done for City and City Utilities programs that affect climate change to help spread awareness (e.g., include climate protection plan logo)
- Create and implement an outreach, education and engagement plan coordinating the efforts of the CPEM task group and the staff/citizen forum
- Choose 2 – 5 "most-achievable" messages/actions for the first year

Medium Term to Long Term (2009-2011)

Goals

- Continue coordinated outreach, education and engagements efforts of the City and the Environmental Committee

Actions

- Choose 2-5 messages/actions to concentrate on each year
- Evaluate impact of previous years' efforts and adjust new efforts accordingly to improve impact and efficiency.
- Expand plan to additional media of communication

Monitoring

The City will measure its progress in educating and motivating the community to act on climate change by conducting informal surveys regarding community attitudes towards climate change, and by evaluating community progress on reducing emissions through the bi-annual inventories discussed in chapter 2.

Table 8.2. Summary of CPP and GRTF Recommendations

GRTF Recommendations	CPP Recommendations	Cost Benefit
Improve communication about "green" issues between nodes.	Create citizen/staff forum with representatives from each node to "institutionalize" this communication	n/a
Identify common goals and reinforce them. Encourage synergy by sharing existing ideas and programs.	Forum would identify top-priority goals and programs for each year and collaborate on implementation	n/a
Create a "bandwagon effect" by making the message about our community's response to global warming constantly reinforced and visible everywhere . Create a sense of moral imperative about this issue.	Staff and citizens would collaborate on determining the most productive mechanisms for delivering this message	n/a
Create synergy, not duplication, between new and existing green activities. Suggestions include identifying a lead organization within each node, asking that organization what is already being done in its area, creating a computer database of those actions, and encouraging each node to adopt its own "green certification" program.	Would be considered by the forum	n/a
Create an overall "PR Umbrella" for Palo Alto green action. The report contains several creative suggestions for implementation, for example: create a logo; run a "green" column in local newspaper(s), city green web page	Sustainability Coordinator would coordinate climate protection-related PR with existing City outreach programs. Each of these examples is included as part of this chapter's recommendations.	n/a
To leverage the work that's already going on and integrate it with new green action, create a public/private partnership.	The forum would serve as the venue for the partnership.	n/a

Glossary

AB1470: California Assembly Bill 1470 (2007), established a requirement for gas-utility-funded solar hot water heating incentive programs.

AB2021: California Assembly Bill 2021 (2006), added to SB1307 new and very specific long-term planning, reporting, and review requirements with specific deadlines, and a requirement to "treat efficiency as procurement investments…without regard to previous minimum investments." AB 2021 requires that utilities develop and submit 10-year energy efficiency plans on a three-year cycle.

AB32: California Assembly Bill 32 (2006), "California Global Warming Solutions Act of 2006," established greenhouse gas reduction targets for California–1990 levels by 2020 and 80% below 1990 levels by 2050.

Acterra: A Palo Alto-based non-profit organization that seeks to bring people together to create local solutions that enhance the natural environment.

Adder: A value used in evaluating investment or purchasing alternatives that credits alternatives for reduced environmental or other impacts.

Anthropogenic: Created by human activity.

Ask an Expert: Call center available to Palo Alto residents and businesses providing Green Building expertise. 1-888-40-GREEN.

B20: a blend of biodiesel which contains 20 percent biodiesel and 80 percent diesel.

BIG: Build It Green, a residential green building rating system.

Biogas: Natural gas fuel made from non-fossil fuel sources.

Biogenic: Created naturally or non-manmade.

Build It Green: A residential green building rating system.

BYOPS: Bring Your Own Place Plate Setting

CACP: ICLEI Clean Air and Climate Protection software used to help determine a portion of the City's GHG emissions.

CARB: California Air Resource Board.

CCAR: California Climate Action Registry. CCAR software is used to determine greenhouse gas emissions from City of Palo Alto Utilities.

CCP: Cities for Climate Protection™ A campaign sponsored by International Coalition of Local Environmental Initiatives which assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability.

CEC: California Energy Commission.

CH_4: Methane, a greenhouse gas with 21 times the global warming potential of CO_2.

CIWMB: California Integrated Waste Management Board

Climate Smart: PG&E retail rate program whereby customers pay extra to invest in CO2 reduction projects.

CMUA GHG Reduction Principles: California Municipal Utilities Association Greenhouse Gas Reduction Principles.

CO_2: Carbon dioxide, a greenhouse gas.

Cogeneration: Simultaneous generation of electricity and useful heat.

CPAU: City of Palo Alto Utilities

CPEM: Climate Protection Education & Motivation

CPP: The City of Palo Alto Climate Protection Plan.

EPP: Environmental Purchasing Policy.

GPR: Green Point Rated. The rating system used by Build It Green.

GRTF: Green Ribbon Task Force.

GULP: Gas utility Long-term Plan.

GWP: Global Warming Potential.

HFC: Hydrofluorocarbons, a greenhouse gas with 140-12,100 times the global warming

potential of CO_2.

ICLEI: International Council of Local Environmental Initiatives, an international association of local governments that promote sustainable development.

IPCC: Intergovernmental Panel on Climate Change, established to assess scientific technical and socio-economic information relevant to understand climate change, its potential impacts and options for adaptation mitigation.

Joint Venture Silicon Valley Climate Protection Taskforce: a Climate Protection Task Force comprised of public agencies to develop strategies for reducing greenhouse gas emissions from city, county, and other agencies' operations.

kWh: A kilowatt hour(1,000 watts). The work performed by one kilowatt of electric power in one hour.

Kyoto Protocol: the United Nations treaty which targets the reduction of greenhouse gases that cause global warming.

LEAP: Long-Term Electric Acquisition Plan.

LEED: Leadership in Energy and Environmental Design. A voluntary, consensus-based national standard for developing high-performance, sustainable buildings.

N2O: Nitrous Oxide, a greenhouse gas with 310 times the global warming potential of CO_2.

NOx: the collective symbol for nitrogen oxides.

Palo Alto Business Goes Green: The Palo Alto Chamber of Commerce campaign to encourage local businesses to become certified as a Santa Clara Valley Green Business.

Life Cycle Cost: Total costs including initial costs, operating costs, maintenance costs, and end-of-life disposal costs.

M&V: Measurement and verification

MMBtu: One million BTUs.

MWh: a Megawatt-hour, or 1,000 kWh.

NAPEE MOU: National Action Plan for Energy Efficiency Memorandum of Understanding (CMR: 316:06).

NCPA: Northern California Power Agency.

Offset: A contract to reduce emissions, by a specified amount, within a specified time, to a specified degree of certainty, or a certificate of proof thereof.

PFCs: Perfluorocarbons, a greenhouse gas with 6,500-9,200 times the global warming potential of CO2.

PM10: Particulate matter less than 10 microns in diameter.

PG&E: Pacific Gas & Electric Company.

PLUG-In: Power from Local Ultra-clean Generation Incentive program. A utilities program that provides incentives for customer-sited small-scale clean distributed power generation such as cogeneration and fuel cells.

PV: photovoltaics, a solar electric generator that converts sunlight directly into electricity using semiconductors.

REC: Renewable Energy Credit, also known as Green Tags or Tradable Renewable Certificates. A certificate of proof that one unit of electricity was generated and delivered by an eligible renewable energy resource.

RPS: Renewable Portfolio Standard.

RWQCP: Regional Water Quality Control Plant-owned and operated by the City of Palo Alto it treats wastewater from Palo Alto and its five partner cities.

SAP: the enterprise software application used by the City of Palo Alto for purchasing and finance operations.

SB 1037: Senate Bill 1037 (2005), established a "loading order" for electric power resources, specifying a preference hierarchy of: first, Energy Efficiency and Demand Reduction; second, Renewable Energy Supply; and then third, Conventional Power Supply.

SB1: California Senate Bill 1 (2006), established the California Solar Initiative to install 3,000 megawatts of solar photovoltaic systems in California over ten years, or approximately one million systems.

SB107: California Senate Bill 1078 (2006), accelerated the California RPS targets to 20% by 2010 instead of 2017, and added annual reporting requirements for publicly-owned electric utilities to report annually to the California Energy Commission.

SB1078: California Senate Bill 1078 (2002), established California's Renewable Portfolio Standard, with targets of achieving 20% of electric supply from eligible renewable resources by 2017.

SB1368: California Senate Bill 1368 (2006), established greenhouse gas content limitations on long-term electricity contracts and generation facilities.

Sequestration: processes that remove carbon dioxide from the atmosphere.

SF_6: Sulfur Hexaflouide, a greenhouse gas with 23,900 times the global warming potential of CO2.

Sinks: a carbon reservoir that is increasing in size.

SSV: Sustainable Silicon Valley, a collaboration of businesses, governments, and non-governmental organizations that are identifying and addressing environmental and resource pressures in the Valley. SSV is engaging prominent Valley organizations to work towards a goal of reducing regional carbon dioxide (CO2) emissions 20% below 1990 levels by 2010.

Sustainability Policy: The City of Palo Alto's Sustainability Policy which outlines the City's intention to meet the economic, social and environmental needs of the city.

TDM: Transportation Design Management

Therm: 100,000 BTUs (British Thermal Units), equivalent to approximately 100 standard cubic feet of natural gas.

US Mayors Climate Protection Agreement: An initiative of the US Council of Mayors in which mayors commit their City to meet or beat the Kyoto protocols.

USEPA: United States Environmental Protection Agency.

WARM: Waste Reduction Model developed by US EPA to help solid waste planners and organizations track and voluntarily report greenhouse gas emissions reductions from several different waste management practices.

Zero Waste: the City's initiative to reduce Palo Alto waste generation to zero by 2021, or as close as a practicable.

Appendix I:
Summary of GRTF Recommendations and CPP Cross Reference

COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
BASELINE	Observation	Would be improved with more frequently updated Palo Alto specific data.	Data on City emissions should be maintained. However, key issue is community inventory. The city should work to improve this segment.
BASELINE	Observation	The committee did not address non-fossil fuel CO2 or other greenhouse gases such as methane, nitrous oxide, refrigerants, or sulfur hexafluoride. - (Include all GHG)	Recommended in CPP Chapter 1
BASELINE	Strategy	In developing targets, devise a method to measure and track progress.	Recommended in CPP Chapter 1
BASELINE	Strategy	Measure progress against time, not against others.	Recommended in CPP Chapter 1
BASELINE	Observation	There is no uniformly accepted baseline methodology for municipalities. (standard tool is needed) Reporting protocols are being developed by agencies such as ICLEI and the California Climate Action Registry	Protocol development has improved since GRTF, but no protocol covers the full range of emissions. CPP uses 3 approved protocols: ICLEI, CCAR and EPA
ENERGY	Strategy	Community businesses, institutions and residents take individual and collective action to reduce their environmental footprint, aided, we hope, by some of the ideas and suggestions presented in this report.	City needs to serve as catalyst for action.
ENERGY	Goal	Council direct or authorize staff to develop a climate action plan for the City utilities department with the goal of achieving climate neutrality by 2020.	Recommended in CPP Chapter 1
ENERGY	Strategy	City Council, Committees, Commissions, Boards, and City staff take these suggestions into account as they develop, review and implement initiatives and programs, and adopt new codes, standards and procedures applicable to energy-related greenhouse gas emissions.	Recommended in CPP
ENERGY	Goal	1. Reduce electricity and natural gas use through conservation and energy efficiency.	Recommended in CPP Chapter 3
ENERGY	Strategy	2. Reduce carbon intensity of energy supply provided by CPAU.	Recommended in CPP Chapter 3

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Summary of GRTF Recommendations and CPP Cross Reference

COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
ENERGY	Strategy	3. Expand use of renewable energy installed or purchased directly by customers.	Recommended in CPP Chapter 3
ENERGY	Strategy	4. Participate in and promote greenhouse gas emissions inventory tracking and reporting.	Recommended in CPP Chapter 3
ENERGY	Strategy	5. Promote and implement climate-neutral alternatives and education.	Recommended in CPP Chapter 3
ENERGY	Strategy	6. Employ urban forest opportunities to reduce energy use and increase carbon sequestration.	Recommended in CPP Chapter 3
ENERGY	Strategy	7. Invest in GHG-reducing projects or offsets to balance remaining emissions.	Recommended in CPP Chapter 3
ENERGY	Strategy	8. Support Research and Development in GHG-reducing science and sociology.	Recommended in CPP Chapter 3
ENERGY	Strategy	9. Coordinate energy climate activities with building and urban planning activities.	Recommended in CPP Chapter 3
ENERGY	Tactic	Community challenge or incentives to report greenhouse gases with a recognized agency such as Sustainable Silicon Valley, California Climate Action registry, and/or other recognized national or international reporting groups.	
ENERGY	Tactic	Actively advertise available tax credits and incentives (such as the current CPAU website)	Recommended in CPP Chapter 3
ENERGY	Tactic	Electricity use and gas use displays in the home and business to encourage conservation, show energy, cost and environmental impacts.	
ENERGY	Tactic	Sponsor a “carbon neutral” homes tour.	
ENERGY	Tactic	Sponsor energy and the environment reference library section.	
ENERGY	Tactic	“Energy Budget”: Require that homes above a certain size be designed to use energy no more than some size (e.g. 3,000 sq ft house) at Title 24 standards, and possibly something similar for businesses.	

Appendix I:
Summary of GRTF Recommendations and CPP Cross Reference

COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
ENERGY	Tactic	Add efficiency checklist as standard in planning and ARB reviews.	Recommended in CPP Chapter 5
ENERGY	Strategy	Zero energy home incentives.	
ENERGY	Tactic	Building permit review “fast lane” for low-energy buildings and energy efficiency improvements.	
ENERGY	Tactic	RECO for rental properties (Residential Energy Conservation Ordinance)	
ENERGY	Tactic	Require solar option on developments over 5 homes rather than 50.	
ENERGY	Strategy	Design for LEED/Green Points for new city buildings.	Recommended in CPP Chapter 5
ENERGY	Tactic	Build a zero-energy home and use for a B&B or Utility Director’s home! Maybe team with Sunset Magazine or other partner.	
ENERGY	Tactic	Time of use rates that incorporate CO2 impacts.	
ENERGY	Tactic	Enhance tiered rate structures to encourage electricity and natural gas conservation - add extra retail rate tier(s) to highest energy users.	
ENERGY	Tactic	Provide incentives for companies to purchase Palo Alto Green – inverse tiered rate structure -- the more you buy the cheaper it is per unit.	
ENERGY	Tactic	Provide voluntary retail rate option to invest in offsets for natural gas use or climate neutral utility bills.	
ENERGY	Tactic	Discount utility rates for Energy Star homes.	
ENERGY	Tactic	Special rates for electric vehicles	
ENERGY	Strategy	Reduce electric and gas distribution system losses.	Recommended in CPP Chapter 3
ENERGY	Tactic	Join Energy Star Partnership - both City government and commercial businesses.	

Appendix I:
Summary of GRTF Recommendations and CPP Cross Reference

COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
ENERGY	Tactic	Acterra Cool Homes program to install compact fluorescent lights (CFLs), low flow shower heads, programmable thermostats, water heater blankets, close lines, adjust water heater temp. and other energy efficiency measures.	
ENERGY	Tactic	Recommission commercial and public facilities to ensure that efficiency measures already taken are working properly.	
ENERGY	Tactic	Install high-efficiency lighting and controls. Lighting is the number one electric end-use and has the highest potential for cost-effective energy efficiency reductions.	
ENERGY	Strategy	Increase use of clotheslines. Natural gas use for residential laundry emits approximately 2,200 tpy.	
ENERGY	Tactic	LED holiday lights for University Avenue would save up to 10-20 tonnes CO2 per year, but more importantly could have a striking visibility and strategic impact if combined with educational information.	
ENERGY	Tactic	Expand solar programs to install solar water, heating, hybrid lighting, and passive solar design.	
ENERGY	Strategy	Support “Solar for schools” program	
ENERGY	Goal	Install 13 MW of Photovoltaics (Goal implied by Million Solar Roofs Legislation SB1)	
ENERGY	Strategy	Install solar hot water systems.	
ENERGY	Tactic	Implement a “Solar Garden” (central PV with subscribers). A solar garden would enable customers without adequate solar resources on their own home or businesses to have solar energy delivered into the CPAU grid from collective action.	

Appendix I:
Summary of GRTF Recommendations and CPP Cross Reference

COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
ENERGY	Tactic	Solar heating for all City and PAUSD pools. Natural gas use for swimming pool heating emits over 4,000 tpy in Palo Alto. Implementing solar sets an example for the community and will save money.	
ENERGY	Tactic	Offer solar-type incentives and rebates for GHG reduction from energy use regardless of technology involved.	
ENERGY	Strategy	Meet all energy load growth with efficiency and renewable resources.	
ENERGY	Tactic	Sign up for Palo Alto Green – e.g. set goal to sign up 50% of load to be PaloAltoGreen. Would likely require Renewable Energy Credits or a change to mix other than 97.5% wind/2.5% solar.	CPP calls for achieving 5% in short term and 10% in long term.
ENERGY	Tactic	Deploy clean small-scale distributed generation, including incentives for local renewables and low-net-GHG cogeneration.	
ENERGY	Tactic	Expand City urban forest management/master plan to recognize energy savings and CO2 sequestration benefits.	
ENERGY	Tactic	Enhance utilities' "Right tree in the Right Place" program expanded to accommodate solar access for PV and hot water.	
ENERGY	Tactic	Increase tree canopy coverage for parking lots. Reduces fuel consumption for car air conditioners and heat island effect.	
ENERGY	Tactic	Utilities purchase GHG offsets equal to the residual GHG content of utilities energy supply offsets (natural gas and electricity).	
ENERGY	Tactic	Individuals and companies purchase GHG offsets equal to the GHG content of utilities energy supply offsets (voluntary).	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
ENERGY	Strategy	Establish a Green Tech Center to facilitate the commercialization of new technologies.	
ENERGY	Strategy	Reduce energy used for landscape maintenance, such as landscaping not requiring lawnmowers (no grass) or using goats instead of lawnmowers.	Recommended in Chapter 6
TRANSPORTATION	Goal	Get more car drivers biking and walking to their destination or to mass transit.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Facilitate increased biking and walking.	Recommended in Chapter 5
TRANSPORTATION	Goal	Improve both local and regional mass transit options and functionality.	Recommended in Chapter 5
TRANSPORTATION	Goal	Increase mass transit availability.	
TRANSPORTATION	Goal	Reduce carbon emissions from vehicles and passenger planes.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Encourage electronic alternatives to travel.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Reduce carbon emissions from vehicles and passenger planes through the increased use of high speed web access and ultimately “live like” video conferencing as an alternative to commuting and traveling.	
TRANSPORTATION	Strategy	Reduce the number of cars driving kids to school and make Palo Alto a leader in safe, healthy, and green school commute options.	Recommended in Chapter 5
TRANSPORTATION	Goal	Reduce emissions from school commuting.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Encourage people to drive less by modifying parking policies.	
TRANSPORTATION	Goal	Improve the efficiency and lower emissions from vehicles in the City and the general public.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Promote alternative fuels.	Recommended in Chapter 5
TRANSPORTATION	Strategy	City leading the way in purchasing fuel-efficient vehicles. (alternative fuel vehicles implied)	Recommended in Chapter 5

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Tactic	Encourage people to drive, fly, and consume less by providing access to web-based educational tools that make the connections between transport and carbon emissions.	
TRANSPORTATION	Goal	Educate the public on transport emissions	Recommended in Chapter 8
TRANSPORTATION	Goal	Reduce commercial transport emissions	
TRANSPORTATION	Strategy	Encourage local purchasing.	
TRANSPORTATION	Strategy	After reductions, offset emissions from remaining driving on fossil fuel.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Consider having the City offset its emissions.	
TRANSPORTATION	Strategy	Encourage businesses and residents to offset its emissions,	Recommended in Chapter 3
TRANSPORTATION	Strategy	Encourage State and Federal legislation in topic areas that would decrease Transportation's contribution to net GHG emissions.	
TRANSPORTATION	Strategy	Lobby for policy changes at region, state, and federal levels.	
TRANSPORTATION	Strategy	Increase bike carriage on mass transit.	
TRANSPORTATION	Tactic	Usage data on bike carriers on VTA buses might reveal further areas where small investments could increase demand.	
TRANSPORTATION	Strategy	Increase bike parking at mass transit stations.	Recommended in Chapter 5 (assume it will be added)
TRANSPORTATION	Tactic	Secure bike storage at transit points can also encourage mass transit use.	Recommended in Chapter 5 (assume it will be added)
TRANSPORTATION	Strategy	Create more bike boulevards and other bike friendly improvements.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Create pedestrian retail zones with enhanced transit, biking & walking access. See also the "Green Parking Policies" section.	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Strategy	CPA should integrate planning for bike and pedestrian friendly crossings at all future street improvement, repaving projects. A request process should formally take public input in this specific area.	
TRANSPORTATION	Tactic	More stoplights sensitive to bikes	
TRANSPORTATION	Tactic	Single car lane through-fares with wide bike paths (e.g. Charleston)	
TRANSPORTATION	Strategy	Pedestrian & bike only street sections in retail areas.	
TRANSPORTATION	Tactic	Better bike parking downtown and at businesses	
TRANSPORTATION	Tactic	over/underpasses to create bike/walk short cuts across otherwise impassible streets/rail lines to transit or other popular destinations	
TRANSPORTATION	Tactic	CPA can focus more effort on improving bike and pedestrian access and bike carriers on VTA, CalTrain, and BART points within Palo Alto.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Require showers at all businesses. Local businesses that generate significant parking demand should make such facilities available to their employees, directly or through health clubs, etc.	
TRANSPORTATION	Tactic	CPA Website should provide information about cycling options within and around the city. It should also support other websites dedicated to addressing the topic such as the bicycling section of 511.org	
TRANSPORTATION	Tactic	Expand Palo Alto shuttle service, with more routes and greater frequency.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Improve system interconnectivity with Caltrain, so that buses and shuttles are synchronized with arriving and departing trains.	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Strategy	Lobby for multi-modal passes and/or tickets that work across transit systems. One implementation of this could be based on the use of personal transponders (similar to FasTrak system used at Bay Area toll plazas).	
TRANSPORTATION	Tactic	Launch public awareness campaign (mass transit)	Recommended in Chapter 8
TRANSPORTATION	Strategy	Require local employers to offer financial incentives for taking public transit.	
TRANSPORTATION	Tactic	Make VTA buses free within Palo Alto or encourage distribution of bus passes by local employers.	
TRANSPORTATION	Tactic	Sync up existing transit, traffic, and weather systems into city sponsored info service.	
TRANSPORTATION	Strategy	Investigate the deployment of an innovative bus based transit solution designed for low density communities.	
TRANSPORTATION	Tactic	Lobby for extending BART around the Bay	
TRANSPORTATION	Tactic	Lobby for a statewide Bullet train system that would connect the major metropolitan areas.	
TRANSPORTATION	Tactic	Lobby for an increase in the frequency of Caltrain express trains.	
TRANSPORTATION	Tactic	Lobby for increased grade separations for Caltrain (to facilitate increase in Caltrain frequency, Bullet Trains, and cross bicycling and walking)	
TRANSPORTATION	Tactic	Promote comparison table from 511.org showing each area employer's support activities for different commute modes. Lets employers see where they stand and how to improve.	
TRANSPORTATION	Tactic	Enable use of Alma/High Garage (Word Garage) as Caltrain parking lot overflow by installing a Day Pass vending machine.	
TRANSPORTATION	Tactic	Facilitate high speed reliable broadband access to homes and businesses	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Tactic	Partner with hotels to support videoconferencing in hotel conference rooms	
TRANSPORTATION	Tactic	Include videoconferencing capabilities in libraries	
TRANSPORTATION	Tactic	Create telecommuting incentives for companies	
TRANSPORTATION	Tactic	Encourage public private cooperation in building web conferencing facilities for small and home based business and residential market.	
TRANSPORTATION	Tactic	Collect videoconferencing best practices for setup and operations	
TRANSPORTATION	Tactic	Consider building or zoning incentives for business who build web conferencing facilities for their employees, other business and the public.	
TRANSPORTATION	Tactic	Offer carbon offsets to employers and individuals who use web conferencing.	
TRANSPORTATION	Tactic	Explore efficacy of block purchases of unused web conferencing time from existing web conferencing facilities by public/private cooperatives.	
TRANSPORTATION	Tactic	Impose annual impact fees for unsuccessful TDM programs (also under Green Parking)	
TRANSPORTATION	Tactic	Make telecommuting a Green Biz Certification Req.	
TRANSPORTATION	Tactic	Promote EPA's Best Workplaces for Commuters program	
TRANSPORTATION	Tactic	Run census on home-based businesses	
TRANSPORTATION	Tactic	Lobby for increased (carbon) tax on fuel and air travel	
TRANSPORTATION	Strategy	Develop more busing programs.	Recommended in Chapter 5
TRANSPORTATION	Tactic	City sponsored shuttles (e.g. Go Fast bus for Gunn), VTA, or PAUSD busing solutions for high traffic routes.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Consider parent user fees to fund useful solutions.	
TRANSPORTATION	Tactic	The City needs to track more data in this area. (school commute)	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Strategy	Support the local Safe Routes to School priorities and programs. This program has shown success by increasing biking, walking, and busing and mostly through grass roots efforts. Volunteers at each school promote commute alternatives and work with the district and City for positive change. This program addresses all modes such as Walking and Biking, Busing, & Carpooling This group has a network in place and can help guide increased efforts to measure and improve the major school commute corridors like the successful Charleston / Arastradero redevelopment.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Encourage PAUSD to take responsibility for reducing emissions.	Recommended in Chapter 5
TRANSPORTATION	Tactic	The district should be encouraged to adopt goals and measures for CO2 reductions from school commuting.	
TRANSPORTATION	Tactic	Adjust and coordinate School start and end times.	
TRANSPORTATION	Tactic	Academic "Choice" programs that require cross town commuting.	
TRANSPORTATION	Strategy	The existing City/School/Parent forums could work to address these (school emissions) concerns with the help of stronger leadership on the city side.	
TRANSPORTATION	Tactic	More and better walking paths to schools	
TRANSPORTATION	Strategy	Facilitate carpooling through coordinated programs	
TRANSPORTATION	Strategy	Empower school commute coordinators	
TRANSPORTATION	Strategy	Promote environmental awareness and change in schools	
TRANSPORTATION	Tactic	Provide covered and secured bike parking at all schools	
TRANSPORTATION	Tactic	Provide transit surge capacity on days of inclement weather	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Tactic	Charge developers a transportation impact fee that pays for shuttles	
TRANSPORTATION	Tactic	Create endowment for school bus shuttles	
TRANSPORTATION	Strategy	Expand parking benefits for green vehicles.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Create more free green vehicle spaces.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Extend parking times for green vehicles.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Provide electric outlets and free charging.	Recommended in Chapter 5
TRANSPORTATION	Tactic	Create pedestrian (i.e. automobile free) retail zones with enhanced transit, biking & walking access. (was in Green parking Policies Section)	
TRANSPORTATION	Tactic	Reduce parking requirements for successful telecommute programs. (also under Electronic Travel)	
TRANSPORTATION	Strategy	Discourage unsuccessful Transport Demand Management programs. (with parking policies)	
TRANSPORTATION	Tactic	Bring parking charges to offices in Palo Alto This would have a big impact but requires Palo Alto to pioneer a parking charges policy for other cities to follow.	Recommended in Chapter 5
TRANSPORTATION	Strategy	Encourage offices to implement parking cashout programs. Parking cashout is where employer gives alternative commuter the value of the freed up parKing space. A parking district could lease the freed up space from employer for more retail/restaurant parking or auto dealer car storage etc.	Recommended in Chapter 5
TRANSPORTATION	Tactic	REALLY compact car parking ('Smart' Car, electric cars)	Being Rolled out in US in late October
TRANSPORTATION	Tactic	Free vanpool parking in downtown lots	
TRANSPORTATION	Tactic	Free, secured parking for scooters, bikes	
TRANSPORTATION	Tactic	Free parking for scooters, bikes	
TRANSPORTATION	Tactic	More parking meters in downtown, in parking lots	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Tactic	Make train accessible/high traffic streets more expensive to park on (except for those driving to train station to use train)	
TRANSPORTATION	Tactic	Permit parking for residents on residential streets near downtown and limited 2 hr parking for the rest.	
TRANSPORTATION	Tactic	Free vanpool parking in downtown lots	
TRANSPORTATION	Strategy	Change city purchasing policy to factor in clean energy/efficiency with special attention to clean energy vehicle procurement	Recommended in Chapter 4, within limitations
TRANSPORTATION	Goal	Enhance the City's ability to promote alternative fuels within the City	Not discussed
TRANSPORTATION	Tactic	Create incentives bio-fuels infrastructure	Not discussed
TRANSPORTATION	Tactic	Create first bay area biofuels gas station in PA	Not discussed
TRANSPORTATION	Strategy	Endorse proposed feebate programs for vehicles based on emissions	
TRANSPORTATION	Tactic	Time of Use electric metering for electric and plug-in hybrid vehicles	Not recommended
TRANSPORTATION	Tactic	Increase low electric rate limit for those with electric and plug-in hybrid vehicles	Not recommended
TRANSPORTATION	Tactic	Partner with the Post Office to partially fund or fuel alternative fuel or hybrid or electric postal vehicles	
TRANSPORTATION	Tactic	Join with Plug-in Partners. The City should promise to purchase of a fleet of plug-in hybrid vehicles once an automaker begins producing such cars commercially	
TRANSPORTATION	Tactic	City should develop or partner to develop a "Reducing Emissions" portion of the Palo Alto City website.	Already in Existence
TRANSPORTATION	Tactic	The reducing emission website should include a carbon calculator and make it available on the web.	
TRANSPORTATION	Tactic	Integrate the carbon calculator with a public awareness campaign to educate people about their carbon emissions.	Recommended in Chapter 3

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Tactic	Add a household transportation related carbon emissions survey to the website.	
TRANSPORTATION	Tactic	Add a carbon-offset clearing-house section that explains the concept of carbon offsets and points users towards existing organizations that sell offsets. (website)	
TRANSPORTATION	Strategy	Ensure the school curriculum includes education on the sources and impact of GHGs and the individual and community strategies to reduce them.	
TRANSPORTATION	Tactic	Use website to highlight the impact of carbon intensive hobbies on emissions such as skiing in Tahoe, buying and keeping empty cabins, etc.	
TRANSPORTATION	Tactic	Palo Alto City website that educates Palo Altans on emissions from long distance transport and encourages citizens to buy locally produced goods and locally grown produce. Educate on the positive climate benefits of patronizing local farmer's markets, which sell local food by definition.	
TRANSPORTATION	Tactic	Integrate website with a public awareness campaign: "Buy Local".	
TRANSPORTATION	Strategy	Encourage grocers to work farmers produce in next to their regular supply of "factory" produce.	
TRANSPORTATION	Strategy	Encourage consumers to favor vegetables over of meat and unprocessed food over processed food. Both meat and processed food have higher carbon footprints.	
TRANSPORTATION	Tactic	Create "Grow your own" campaign and build on the recycling center's "Give and Experience for Christmas (e.g. movie, play, sports event, rather than a physical good)" communications to reduce refuse	
TRANSPORTATION	Strategy	Combine efforts to create local buying options with neighboring cities	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Strategy	Encourage less packaging to reduce deliveries	
TRANSPORTATION	Tactic	Sponsor a tax on non-recyclable packaging	
TRANSPORTATION	Strategy	Encourage consumers to buy produce "in season"	
TRANSPORTATION	Tactic	Purchase carbon credits to offset City owned fleet vehicle emissions	
TRANSPORTATION	Strategy	Provide incentives to cause businesses to offset carbon emissions in vehicles and travel in general.	
TRANSPORTATION	Strategy	Encourage businesses and individuals to purchase carbon offsets when they buy air travel either directly through travel websites or offset firms.	
TRANSPORTATION	Tactic	Build carbon offset option into DMV vehicle license renewal.	
TRANSPORTATION	Tactic	Use parking meter revenues to offset carbon emissions.	
TRANSPORTATION	Tactic	Create gas tax to purchase carbon credits.	
TRANSPORTATION	Tactic	Offer carbon offset option at PA gas pumps used to subsidize e-cars.	
TRANSPORTATION	Tactic	Encourage carbon offset groups and airline Frequent Flyer miles programs to develop "use your miles to buy offsets" program.	
TRANSPORTATION	Strategy	Lobby at all levels for increased (carbon) tax on fuel for auto, air, and sea transportation.	
TRANSPORTATION	Strategy	Lobby for increased Bike Carriage on Mass Transit	
TRANSPORTATION	Strategy	Lobby to Change State purchasing policy to factor in clean energy/efficiency with special attention to clean energy vehicle procurement	
TRANSPORTATION	Strategy	Lobby to Create incentives bio-fuels infrastructure	
TRANSPORTATION	Strategy	Endorse proposed fee-bate programs for vehicles based on emissions	
TRANSPORTATION	Strategy	Sponsor a tax non-recyclable packaging	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
TRANSPORTATION	Strategy	Lobby for multi-modal passes and/or tickets that work across transit systems. One implementation of this could be based on the use of personal transponders (similar to FasTrak system used at Bay Area toll plazas).	
TRANSPORTATION	Strategy	Lobby for a statewide Bullet train system that would connect the major metropolitan areas.	
TRANSPORTATION	Strategy	Lobby for extending BART down the Peninsula and also providing a line across the bay at the Dumbarton bridge instead of the proposed rail line.	
TRANSPORTATION	Strategy	Lobby to Increase the frequency of Caltrain express trains.	
TRANSPORTATION	Strategy	Lobby for Grade separations for Caltrain (to facilitate increase in Caltrain frequency, Bullet Trains, and cross bicycling and walking)	
TRANSPORTATION	Strategy	Lobby to Build carbon offset option into DMV vehicle license renewal	
TRANSPORTATION	Strategy	Lobby to Create state or local gas tax to purchase carbon credits	
BUILDINGS	Strategy	Provide incentives to encourage businesses and residents to invest in efficiency and renewables; and explore requiring energy upgrades (e.g., installation of solar hot water) when a property changes hands or undergoes significant improvement).	
BUILDINGS	Strategy	Use trees to save energy.	
BUILDINGS	Strategy	Encourage or require water efficiency and aquifer replenishment.	
BUILDINGS	Strategy	Encourage transit-oriented development	
BUILDINGS	Strategy	Promote biking and walking.	Recommended in Chapter 5

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
BUILDINGS	Tactic	Provide green building planning and building review advice and education by hiring new, training existing staff or using consultant time.	Recommended in Chapter 6
BUILDINGS	Tactic	Require senior building officials to be LEED (Leadership in Energy and Environmental Design) accredited and BIG (Build it Green) certified.	Recommended in Chapter 6
BUILDINGS	Tactic	Provide green educational materials at planning and building department. Some examples might include Building Resource guides; Information on Green lenders; Energy Star and water-wise incentives; Information on nonprofit benefits, e.g., tax deduction for donation of building materials deconstructed for reuse rather than demolition; Information on tax credits for energy-efficient and green building projects.	Recommended in Chapter 6
BUILDINGS	Tactic	Require LEED points list to be printed on nonresidential permit drawings, and require an escalating number of points be met over a period of years.	
BUILDINGS	Tactic	Require BIG points list to be printed on residential permit drawings, and require an escalating number of points be met over a period of years.	
BUILDINGS	Tactic	Provide incentives or recognition for incorporating green building elements in both residential and nonresidential buildings.	
BUILDINGS	Tactic	Offer expedited reviews or lower costs for green energy projects. Examples of eligible projects might include: · Projects that exceed Title 24 guidelines by at least 15 percent. · Projects that incorporate radiant barriers for all new and re-roofing.	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
BUILDINGS	Tactic	Allow specific exemptions to building guidelines when green elements are applied. For example, provide floor-area ratio allowances in cases where walls are built extra thick for energy efficiency. Likewise, allow some flexibility in setbacks to allow solar building orientation.	
BUILDINGS	Tactic	Establish special considerations for green building/high-performance building projects. In a vein similar to HIE (Home Improvement Exemption), consider creating a "Green Improvement Exemption" (GIE).	
BUILDINGS	Tactic	Build or establish more traffic reducing housing (TRH) in Palo Alto. For example, when selling or renting new apartments, condos, and town homes, select residents who commit to owning fewer cars and driving less.	
BUILDINGS	Tactic	Increase incentives for traffic-reducing commercial. For example, offer stipends for employees that live within a short distance of their work.	
BUILDINGS	Tactic	Create a fund for energy efficiency consultants to address the needs of both large and small clients.	
BUILDINGS	Strategy	Encourage renewable power, such as photovoltaics.	Recommended in Chapter 3
BUILDINGS	Strategy	Encourage energy-efficient water heating solutions, such as tankless and solar water heating.	
BUILDINGS	Tactic	Explore a residential energy consumption ordinance (RECO) similar to that in effect in the city of Berkeley, which requires an energy upgrade when a property changes hands or undergoes significant improvement.	
BUILDINGS	Tactic	Increase ratio of trees to spaces in parking areas and in paved areas to prevent heat islands.	
BUILDINGS	Strategy	Implement water efficiency. Examples might include Xeriscaping, weather linked irrigation controllers, native plantings.	
BUILDINGS	Strategy	Implement trees planted optimally for building shading	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
BUILDINGS	Strategy	Encourage aquifer replenishment. For example, require use of pervious concrete for paved areas or rainwater catchment.	
BUILDINGS	Goal	Create more residential density downtown, near train stations, and at public transit corridors (e.g., El Camino Real).	Recommended in Chapter 5
BUILDINGS	Strategy	Implement bike circulation and bike parking in all areas, and increase communication of bike routes and amenities.	
BUILDINGS	Strategy	Encourage outdoor seating and pedestrian access at commercial areas such as University Avenue and California Avenue, similar the City of Mountain View's approach.	
BUILDINGS	Strategy	Reduce parking space requirements for well-located, high-density residential developments.	
EDUCATION	Mission	Improve communication about "green" issues between nodes.	Possible role for Sustainability Coordinator
EDUCATION	Mission	Identify common goals and reinforce them. Encourage synergy by sharing existing ideas and programs.	Possible role for Sustainability Coordinator
EDUCATION	Mission	Create a "bandwagon effect" by making the message about our community's response to global warming constantly reinforced and visible everywhere . Create a sense of moral imperative about this issue.	Possible role for Sustainability Coordinator
EDUCATION	Strategy	(1) Create synergy, not duplication, between new and existing green activities.	Primary goal of CPP
EDUCATION	Tactic	Identify a lead organization within each node, asking that organization what is already being done in its area, creating a computer database of those actions, and encouraging each node to adopt its own "green certification" program.	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
EDUCATION	Strategy	(2) Create an overall “PR Umbrella” for Palo Alto green action.	Possible role for Sustainability Coordinator
EDUCATION	Tactic	Create a name, logo and branding for GRTF activities.	Possible role for Sustainability Coordinator
EDUCATION	Tactic	Brand Palo Alto as the Green City.	Possible role for Sustainability Coordinator
EDUCATION	Tactic	Permission to use PaloAltoGreen logo	Possible role for Sustainability Coordinator
EDUCATION	Tactic	Green column in the PA Weekly, daily news, on-line news sources.	Possible role for Sustainability Coordinator
EDUCATION	Tactic	City Green web page	Already in Existence
EDUCATION	Tactic	Create easy way to use green logo and tagline.	Already in Existence
EDUCATION	Tactic	Publicize need to reduce emissions with billboards, contest and workshops	
EDUCATION	Tactic	(3) To leverage the work that’s already going on and integrate it with new green action, create a public/private partnership.	Primary goal of CPP to actuate this recommendation
EDUCATION	Tactic	Assign a part-time City staff person to this public/private partnership,	Part of Sustainability Coordinator
EDUCATION	Strategy	Act as a "filter" for the findings of the other GRTF subcommittees (Baseline, Buildings, Education, Energy, Transportation, and Waste Reduction) which can be effectively communicated to the public.	Primary goal of CPP
EDUCATION	Goal	Educate and motivate all segments of the Palo Alto community to take quantifiable action to reduce carbon emissions.	Primary goal of CPP
EDUCATION	Strategy	Identify and publicize the actions that people and organizations are now already doing about climate change.	
EDUCATION	Strategy	Using the recommendations of the GRTF, synthesize and design a community awareness program.	
EDUCATION	Tactic	Measure the results of this education/motivation program.	

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COMMITTEE	GOAL STRATEGY TACTIC OBSERVATION MISSION	Green Ribbon Task Force Recommendation or Idea	Climate Protection Plan Cross Reference
EDUCATION	Tactic	Honor the accomplishments of the community on a yearly basis.	

Appendix II:
Possible Actions by Short Term, Medium Term, and Long Term

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Short Term		**Goal by July 2009 = for the City to reduce emissions by 5%= reduction of 3,266 tons**		**Goal = 3,266**		
Chapter 3 Utilities	1	Promote and Implement Climate-Neutral Alternatives and Education	TBD	TBD	TBD	Funding in current budget
Chapter 3 Utilities	1	Support Research and Development in GHG-Reducing Science and Sociology	TBD	TBD	TBD	Partial funding in current budget
Chapter 3 Utilities	1	Expand Use of Renewable Energy Installed or Purchased Directly By Customers	$ 135,000	3,280	41	Funding in current budget
Chapter 3 Utilities	1	Achieve participation in Palo Alto Green to meet 5% of load	-	17,700		There is a cost to the community of 1.5 cents per kilowatt hour (50,000 MWh)
Chapter 3 Utilities	1	City match community participation level in subscription to Green Power 5%	$ 22,000	550	40	Needs additional funding
Chapter 4 Sustainable Purchasing	1	Create an interdepartmental team responsible for completing a Sustainable Purchasing Policy and Implementation Plan by June 2008	TBD	TBD	TBD	Partial funding in current budget
Chapter 4 Sustainable Purchasing	1	Conduct outreach and education among City employees to promote understanding and participation in Sustainable Purchasing goals	TBD	TBD	TBD	Costs to be determined
Chapter 4 Sustainable Purchasing	1	Establish a framework and criteria for identifying, specifying, and evaluating the performance and costs of sustainable products and services	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Determine annual reporting needs for the City	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Include a three-year timeline for incorporating changes to the City's purchasing specifications, scopes of service, and procedures	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Present to Council the Sustainable Purchasing Policy and Implementation Plan by June 2008	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Make recommendations for financial resources needed to implement Sustainable Purchasing	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Require annual vendor reporting on sustainable product purchases, tracking dollars spent, units purchased, and other information as specified by the City	TBD	TBD	TBD	Costs to be determined
Chapter 4 Sustainable Purchasing	1	Purchase only remanufacturered toner cartridges when available.	$ (13,380)	$ 2	$ (6,690)	Funding in current budget
Chapter 4 Sustainable Purchasing	1	Mandate Purchasing of only 100% recycled content paper when available.	$ 6,000	33	185	Needs additional funding
Chapter 5 Transportation	1	City allows telecommuting to reduce emissions by 53 metric tons.	$ -	53	-	While there would be no budget implications, telecommuting may cause an increase in administrative costs.
Chapter 5 Transportation	1	Purchase Carbon Offsets for Employee Business Travel (38 ton reduction)	$ 1,300	39	33	Not currently funded
Chapter 5 Transportation	1	Increase the TDM Coordinator from .5 FTE to 1.0 FTE	$ 50,000	TBD		Not currently funded

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Chapter 5 Transportation	1	Facilitate and enhance potential for mixed use development	TBD	TBD	TBD	Funding in current budget
Chapter 5 Transportation	1	Zone for Mixed Use and Higher Density Around Transit Stations	TBD	TBD	TBD	Funding in current budget
Chapter 5 Transportation	1	Reduce Parking Needs for New Development	TBD	TBD	TBD	Funding in current budget
Chapter 5 Transportation	1	Require Transportation Demand Management (TDM) Programs	TBD	TBD	TBD	Funding in current budget
Chapter 5 Transportation	1	Develop Monitoring Programs for Transit Use and TDM Effectiveness	TBD	TBD	TBD	Funding in current budget
Chapter 5 Transportation	1	Reduce idling by installing auxiliary electrical systems	$ 40,000	136	295	Not currently funded
Chapter 6 Green Building	1	Create task force or review committee composed of developers, architects and other stakeholders to provide feedback and ideas on approaches to green building incentives and requirements.	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Continue benchmarking green building programs of other cities and identify and resolve any potential legal issues related to mandatory compliance.	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Continue to work with Utilities staff on developing and implementing meaningful incentives.	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Coordinate with Utilities and Public Works programs, and with newly created staff/citizen forum on public	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Draft and circulate an ordinance for mandatory multi-family and commercial green building and introduce the ordinance for passage in spring 2008 (July 2008 effective date).	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Train existing staff (and possibly offer a pay incentive for certification or accreditation) or contract out for expertise in LEED and Green Point Rated (e.g. projects not designed by a LEED accredited architect/engineer could pay a fee for review by someone with LEED expertise).	TBD	TBD	TBD	Costs to be Determined
Chapter 6 Green Building	1	Following Council discussion on December 3, 2007, update the existing City green building policy.	TBD	TBD	TBD	Funding in current budget
Chapter 6 Green Building	1	Retain consultant to perform relevant studies to justify local amendments to the CEC that will require increased energy efficiency and conservation measures. Adopt local amendments to the CEC with applicable findings and submit to both the California Building Standards Commission and California Energy Commission	TBD	TBD	TBD	Staff and consulting costs to be determined
Chapter 7 Zero Waste		Integrate climate protection analysis into the Zero Waste decision-making process	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Expand efforts in waste prevention through legislation, policies, ordinances, outreach and technical assistance	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Reduce the amount and toxicity of consumer product waste through measures that place the appropriate level of responsibility on manufacturers for the end-of-life of their products	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Encourage innovative reuse and recycling services to be added by the private sector and nonprofit groups, such as electronics and building materials, so the City does not have to invest in those activities	TBD	TBD	TBD	Funding in current budget

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Chapter 7 Zero Waste	1	Work with residents, businesses, community organizations, Bay Area Product Stewardship Council, Bay Area Zero Waste Communities, Bay Friendly Regional Coalition and other such groups to further the City's Zero Waste efforts	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Modify the Construction and Demolition (C&D) debris ordinance to: increase the amount of materials salvaged for reuse; ncrease the diversion percentage required for demolition permits from 50% to 75%; and increase the number of projects that are covered by the ordinance	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Expand collaborative efforts with targeted businesses to reduce the use of disposable items such as plastic shopping bags and take-out containers	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Facilitate connections between food rescue organizations and Palo Alto businesses to reduce the amount of food discarded into the waste stream	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Support development of a Sustainable Purchasing Policy and Implementation Plan	TBD	TBD	TBD	Needs additional funding
Chapter 7 Zero Waste	1	Propose a grant or loan program for local reuse and recycling	TBD	TBD	TBD	Needs additional funding
Chapter 7 Zero Waste	1	Ensure that new waste collection and processing service RFP includes Zero Waste service options (e.g., expanded organics collection, expanded C&D debris collection and container inspections upon collection)	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Enhance business, multi-family and school waste reduction programs	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Divert remaining debris boxes rich in C&D materials to C&D processing facilities	TBD	TBD	TBD	Needs additional funding
Chapter 7 Zero Waste	1	Propose a phased-in mandatory recycling ordinance	TBD	TBD	TBD	Needs additional funding
Chapter 7 Zero Waste	1	Propose materials to be banned from the Palo Alto Landfill	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Retool the SMaRT Station to increase diversion rate from 18% to 25%	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	1	Find a location for a local recycling drop-off center and household hazardous waste facility	TBD	TBD	TBD	Needs additional funding
Chapter 8 Education/ Motivation	1	Create an internal Climate Protection Education and Motivation (CPEM) task group from the Environmental Stewardship Steering Committee that includes representatives from the affected departments	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Create and convene a collaborative citizen/staff forum	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Define goal-setting process for staff/citizen forum	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Forum identifies its top-three priorities for the coming 1-3 year period	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Forum selects top-3 projects or actions for implementation in year 1	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Create and implement an outreach, education and engagement plan coordinating the efforts of the CPEM task group and the staff/citizen forum	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Choose 2 – 5 most-achievable messages/actions for the first year	TBD	TBD	TBD	Costs to be determined

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Chapter 8 Education/ Motivation	1	Explore the options for creating baseline data of the community's awareness	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	1	Integrate climate protection into City outreach, harnessing outreach currently done by City and CPAU	TBD	TBD	TBD	Costs to be determined
Medium Term		**Goal by July 2011 = for the City and community to reduce emissions by 5%= reduction of 39,702 tons**				
Chapter 3 Utilities	2	Develop voluntary CO2 reductions for Gas	$ -	16,400	-	
Chapter 3 Utilities	2	Invest in GHG-Reducing Projects or Offsets to Balance Remaining Emissions	$ 25,000	1,000	25	Partial funding in current budget
Chapter 3 Utilities	2	Participate in and Promote Greenhouse Gas Emissions Inventory Tracking and Reporting	TBD	TBD	TBD	Funding in current budget
Chapter 3 Utilities	2	Employ Urban Forest Opportunities to Reduce Energy Use and Increase Carbon Sequestration	TBD	TBD	TBD	Funding in current budget
Chapter 3 Utilities	2	Coordinate Energy Climate Activities with Building and Urban Planning Activities	TBD	TBD	TBD	Funding in current budget
Chapter 4 Sustainable Purchasing	2	Implement full duplexing as default in all printers and copiers in City facilities when possible	$ 20,000	29	$ 696	Additional funding required for set-up period only. Assumes printer and copier replacement as scheduled (no acceleration).
Chapter 4 Sustainable Purchasing	1	Expand staff education and engagement efforts	TBD	TBD	TBD	Staff costs to be determined
Chapter 4 Sustainable Purchasing	2	Implement programs and procedures that encourage and facilitiate both centralized and decentralized purchases of sustainable products and services	TBD	TBD	TBD	Costs to be determined
Chapter 4 Sustainable Purchasing	2	Review and revise Sustainable Purchasing Plan and timeline annually and realign with City GHG emission goals and other priorities as needed	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	2	Fleet optimization to reduce emissions by 284 metric tons	$ 14,820	285	$ 52	Funding for implementation is in FY 06/07 budget. There would be some additional administrative costs, but these would likely be offset by savings on fuel and vehicle use.
Chapter 5 Transportation	2	Purchase 2 Hybrids (per car/Total) – CO2 reduction of 1.37/car or 27 metric tons for fleet total	$ 1,700	3	88	Needs additional funding
Chapter 5 Transportation	2	Fleet Accountability Programs to reduce emissions by 95 metric tons	$ 12,000	95	126	Needs additional funding
Chapter 5 Transportation	2	Limit Idling to same 136 metric tons CO2 (approximately $2,000 per truck)	$ 40,000	136	294	Needs additional funding
Chapter 5 Transportation	2	Expand use of biodiesel (18.6 metric tons emission reduction)	$ 12,392	19	652	Needs additional funding
Chapter 5 Transportation	2	Increase Employee Commute Incentives ($242/metric ton)	$ 301,532	284	1,062	Needs additional funding
Chapter 5 Transportation	2	Enhance use of Cross town shuttles (180 metric tons reduced)	$ 125,000	180	694	Needs additional funding
Chapter 5 Transportation		Increase the Transportation Demand Management (TDM) Coordinator from .5 FTE to 1.0 FTE.	$ 50,000	TBD	TBD	Needs additional funding
Chapter 5 Transportation	2	Purchase Offsets for Community Air Travel	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	2	Work with School District and parent community to reduce emissions from school commute	TBD	TBD	TBD	Costs to be determined

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Chapter 5 Transportation	2	Purchase very low emission vehicles to serve as shuttle services between City Hall, Municipal Services Center and the Regional Water Quality Plant	$1,175 per vehicle per year	2.3	$ 510	
Chapter 5 Transportation	2	Implement Pedestrian and Transit Oriented Zoning in Downtown	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	2	Develop Comprehensive Plan Programs to Support Increased Density near Transit	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	2	Modify Zoning Ordinance to Require Pricing Strategies to Reduce Parking	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	2	Develop Plans for Transportation Improvements around California Avenue Caltrain Station	TBD	TBD	TBD	Costs to be determined
Chapter 6 Green Building	2	Explore new financing opportunities for green building efforts (e.g. green-friendly banks such as New Resource Bank and Valencia Green Bank.)	TBD	TBD	TBD	Costs need to be determined, though the costs will be at least partially offset by reduced fuel use by fleet.
Chapter 6 Green Building	2	Introduce an ordinance for mandatory low-density residential green building for passage in spring 2009 (effective July 2009.)	TBD	TBD	TBD	Staff Administrative costs
Chapter 6 Green Building		Increase understanding of green building practices and benefits through stakeholder involvement.	TBD	TBD	TBD	Staff Administrative costs
Chapter 6 Green Building	2	Continue to conduct staff training (and reward certification/accreditation).	TBD	TBD	TBD	Staff Administrative costs
Chapter 6 Green Building	2	Review and revise Sustainable Purchasing Plan and timeline annually and realign with City GHG emission goals and other priorities as needed	TBD	TBD	TBD	Staff and consulting costs to be determined
Chapter 6 Green Building	2	Include “green building” among criteria for determining the 2010 ARB award winners.	TBD	TBD	TBD	Funding in current budget
Chapter 7 Zero Waste	2	Achieve 68% waste diverted from landfill	$615,000	6,427	96	Needs additional funding
Chapter 7 Zero Waste	2	Modify garbage rates to encourage Zero Waste	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Collaborate with the Planning and Community Environment Department to increase Green Building and adaptive reuse efforts	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Build on collaborative efforts with targeted businesses to reduce disposable items	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Propose Sustainable Gardening and Landscaping Policy and Implementation Plan	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	In new collection contract, expand the organics program; provide recycling services to all commercial customers; expand types of recyclable materials collected; improved bulky item collection; and divert	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Propose possible product bans or fees to reduce product use, such as bottled water or plastic bags	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Implement approved material bans and mandatory recycling ordinances	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	2	Improve recycling in public areas	TBD	TBD	TBD	Costs to be Determined
Chapter 8 Education/ Motivation	2	Integrate learning into new employee training	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Work with HR to create new training program for all current employees regarding climate protection and other environmental issues	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Integrate climate consciousness into City functions	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Create an incentive program to reward departments or divisions that implement effective reduction efforts	TBD	TBD	TBD	Costs to be determined

Chapter	Short Term =-1; Medium Term = 2, Long Term =3	Possible Action	Total Cost to City	Total metric tons of CO_2e Reduced	Cost Per Ton of CO_2e Removed	Budget Implications
Chapter 8 Education/ Motivation	2	Evaluate impact of previous years' efforts and adjust new efforts accordingly to improve impact and efficiency.	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Expand plan to additional media of communication	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation		CPEM to identify staff actions that have the greatest impact on CO_2 emissions	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Create internal working groups to address the identified actions	TBD	TBD	TBD	Costs to be determined
Chapter 8 Education/ Motivation	2	Launch campaigns to encourage desired actions and practices.	TBD	TBD	TBD	Costs to be determined
Long Term		**Goal by July 2020 = for the City and community to reduce emissions by 15%= reduction of 119,107 tons**				
Chapter 3 Utilities	3	Reduce electricity and natural gas use through conservation and energy efficiency. Extrapolated from 10 year efficiency plan.	$0.00	22,100	-	Funding in current budget
Chapter 3 Utilities	3	Reduce Carbon Intensity of Energy Supply Provided by CPAU	$ 5,000,000	91,000	55	Funding in current budget
Chapter 3 Utilities	3	Promote Solar Initiatives	$ 25,000	250	100	Funding in current budget
Chapter 3 Utilities	3	Achieve participation in Palo Alto Green to meet 10% of load	-	35,400		There is a cost to the community of 1.5 cents per kilowatt hour (50,000 MWh)
Chapter 3 Utilities	3	City to increase its participation in Palo Alto Green from 5% to to match community 10% of load	$ 22,500	550	41	1.5 cents per kilowatt hour
Chapter 7 Zero Waste	3	Achieve 73% of Diverted Waste	$ 3,376,000	$ 6,849	493	
Chapter 4 Sustainable Purchasing	3	Review Sustainable Purchasing Plan every 3 years	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	3	Evaluate Pedestrian and Transit Oriented Development Zoning Intensity, Including Along El Camino Real	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	3	Develop Intermodal Transit Center and High-Density Public Transportation on Demand Project	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	3	Implement Grand Boulevard Improvement Strategies for El Camino Real	TBD	TBD	TBD	Costs to be determined
Chapter 5 Transportation	3	Work with VTA, Caltrain and other regional transportation agencies to improve transit services in Palo Alto	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	3	Evaluate emerging technology or other innovative approaches to materials management	TBD	TBD	TBD	Costs to be determined
Chapter 7 Zero Waste	3	Continue to develop and implement Zero Waste programs	TBD	TBD	TBD	Costs to be determined

Appendix III:
Draft Elements of Palo Alto Sustainable Purchasing Policy

The City recognizes that its purchases of goods and services can contribute significantly to the success of its sustainability policies and goals. Therefore, the City shall incorporate environmental, economic and social stewardship criteria into its purchases of products and services. This policy will align the City's purchases and Purchasing Department policies and procedures with the City's sustainability policies and programs to:

- protect and conserve natural resources
- minimize the City's contributions to global warming, solid waste, local and global pollution, and toxic chemical exposures to people and the environment and
- promote human health and well-being.

This policy shall not require the City to exclude competition, or to purchase products or services that do not perform adequately or are not available at a reasonable price in a reasonable period of time.

To achieve these goals the City shall create and maintain a Sustainable Purchasing Committee and Sustainable Purchasing Plan. The Committee will include management-level staff from Purchasing and representatives from Public Works, Utilities, Transportation, and other relevant departments as identified by the City Manager or his/her designee. The Committee will write a plan and procedures that:

- provide a three year timeline for implementing changes to the City's purchasing specifications, scopes of service, and procedures. Tasks will be prioritized based on need and available resources. This timeline will be reviewed annually and adjusted as needed.
- develop a framework to identify preferable products and services
- develop criteria to evaluate the cost, performance and sustainable benefits of those products and services. This criteria would employ a total cost of ownership analysis which includes life cycle factors such as energy and water use, maintenance, replacement, disposal and recycling, and environmental and social benefits to the local and global community
- engage all City staff to identify sustainable products and services that are not purchased centrally, e.g., via CalCards
- educate staff on new products and purchasing procedures that are centrally purchased
- support external purchasing-related initiatives and programs that benefit City sustainability goals, e.g., extended producer responsibility and independent product and service performance certifications
- require annual vendor reports on sustainable product purchases tracking dollars spent, units purchased, and other information as specified by the City
- determine an appropriate program reporting approach
- create financial recommendations for resources that are needed to implement and maintain this policy

This policy and plan will be reviewed every three years by the Sustainable Purchasing Committee or as needed to realign with City priorities and requirements.

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